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ABSTRACT

This report presents the results of research that had as its objective the evaluation of the curricula of the U.S. Coast Guard Academy. Over 125 Coast Guard officers and men were interviewed to gather detailed background information about the Coast Guard, the Coast Guard Academy, and job requirements of Academy graduates. These data were developed into a Job-Task Inventory Questionnaire (JTIQ) which was administered to Academy graduates, and yielded information as to the critical tasks required of officers during their early years of Coast Guard service. The JTIQ responses and two CG-developed documents ("A Study to Determine the Future Commissioned Officer Requirements of the CG-1972-1982" and the "Long Range View" paper) were analyzed and, through standard systems analytic procedures, recommendations for changes to the Academy curricula were developed. (Author)

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The U.S. Coast Guard Academy Curricula: An Evaluation

Theodore R. Powers, James A. Caviness,
T.O. Jacobs, and Jeffery Maxey

HUMAN RESOURCES RESEARCH ORGANIZATION
300 North Washington Street • Alexandria, Virginia 22314

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Prepared for

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FOREWORD

This report presents the results of research conducted to evaluate the current curriculum of the United States Coast Guard Academy. The objectives of the study were (a) to analyze performance needs for U.S. Coast Guard junior officers in order to determine the educational and training requirements necessary for the U.S. Coast Guard Academy, (b) to provide a functional description of the Academy's current curriculum in order to determine what educational and training requirements are being met, and (c) to evaluate the ability of the current curriculum to meet the future needs of the service and to make recommendations for deletions and additions to the curriculum, as needed, to enable the Coast Guard to meet its requirement for adequately trained and educated officers for the period extending to 1982. This research was funded under contract DOT-CG-22523-A, U.S. Coast Guard Headquarters, Washington, D.C. "This report was submitted to the U.S. Coast Guard in November 1973 as HumRRO Final Report FR-D4-73-18."

The research was primarily conducted at HumRRO Division No. 4 at Fort Benning, Georgia. Dr. T.O. Jacobs is Director of Division No. 4. The research team consisted of Mr. Theodore R. Powers, Principal Investigator, Dr. Jacobs, Mr. Jeffery L. Maxey, and Mr. George J. Magner. Dr. James A. Caviness acted as Principal Investigator during the initial stages of the project and as a consultant during the later stages. Additional consultants for the project were Captain Ira McMullan, U.S. Coast Guard (Ret.), Dr. E.A. Rundquist, U.S. Naval Personnel Research Laboratory, and Captain Ephraim Rivard, U.S. Coast Guard (Ret.).

The project monitor for the U.S. Coast Guard Headquarters was Mr. Joseph J. Cowan. Captain Roderick White acted as project monitor for the U.S. Coast Guard Academy. All computer and data analysis support was provided by the U.S. Coast Guard Headquarters under the supervision of Mr. Richard Lanterman, assisted by LT (JG) Harry S. Gierhart.

Meredith P. Crawford
President
Human Resources Research Organization

SUMMARY

This report presents the results of research that had as its objective the evaluation of the curricula of the U.S. Coast Guard Academy. The evaluation was carried out during the period April 1972-September 1973. Data for the evaluation were gathered from several sources. Initially, 25 trips and visits in which over 125 Coast Guard officers and men were interviewed were conducted, to gather detailed background information about the Coast Guard, the Coast Guard Academy, and job requirements of Academy graduates. These data were developed into a 678-item Job-Task Inventory Questionnaire (JTIQ), which was administered to 548 Academy graduates serving in many different billets. Analysis of the JTIQ yielded information as to the critical tasks required of these officers during their early years of Coast Guard service.

To project job requirements over a longer time frame, two documents developed by the Coast Guard were provided the contractor. The first was "A Study to Determine the Future Commissioned Officer Requirements of the United States Coast Guard: 1972-1982" (the Rice Study), which provided quantitative data on future officer billet requirements. The second document was "Long Range View of the Coast Guard" revised 13 August 1971, a paper which outlined in more philosophical terms the general and specific objectives of the Coast Guard during the next decade.

These three sources of information, supported by interviews and discussions with cognizant Coast Guard personnel both at Headquarters and at the Academy, were analyzed and recommendations for changes to the Academy curricula were developed through standard systems analytic procedures.

The specific recommendations for revision of the Academy curricula are detailed and complex. They involve the recommended deletion of five current option plans and the addition of two new option plans. Numerous courses are specifically identified for consideration for deletion and a group of new courses are recommended for addition to the curricula. Finally, comments and recommendations are made concerning the Athletic Program and the various other nonacademic programs at the Academy.

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The U.S. Coast Guard Academy Curricula: An Evaluation

Section 1

INTRODUCTION

BACKGROUND

The United States Coast Guard

The United States Coast Guard (USCG) is one of the six operating units of the U.S. Department of Transportation during peacetime. In time of war or in a time of declared national emergency, the USCG, or parts thereof, at the request of the President, operates as a part of the U.S. Navy.

Established in 1790 by Alexander Hamilton, the USCG today has a peacetime manpower strength of 37,000 men and maintains a fleet of 60 distinct classes of vessels and nearly 20 different types of aircraft. The large number of personnel and the variety of vessels reflect the many diverse tasks that the USCG now performs, and suggest the magnitude of the educational and training programs required to prepare career Coast Guard personnel.

The United States Coast Guard Academy

The United States Coast Guard Academy (USCGA) is the primary source of career officers for the nation's oldest continuing sea-going service. The mission of the Academy is "to graduate young men with sound bodies, stout hearts, and alert minds, with a liking for the sea and its lore, and with the high sense of honor and obedience which goes with trained initiative and leadership; well-rounded in seamanship, the sciences, and the amenities, and strong in the resolve to be worthy of the tradition of commissioned officers in the USCG in the service of their country and humanity."

The Academy was established by an Act of Congress dated July 31, 1876, and is located on a 100-acre campus on the Thames River in New London, Connecticut. The Academy has developed a well-rounded course of academic and military instruction. Training occurs in modern classrooms and laboratories as well as on board the training barque EAGLE and in many operational units ashore and afloat. The course of instruction at the Academy is a four-year college degree program consisting of a core curriculum, a choice of options, and a variety of electives. After graduation, the student receives a commission in the USCG and is obligated to a minimum of five years' service. As an officer he will join one of the air, sea, or land activities of the USCG and take up the responsibilities of his calling.

Coast Guard officer job requirements are diverse and demanding, ranging from duty at small, nearly self-sufficient units located at isolated stations to postgraduate studies at large metropolitan universities. The training and education necessary for excellent job performance are a composite of military and nautical skills and intellectual self-confidence and flexibility. Although not all of the training and education can be done most effectively and efficiently at the Academy, the Academy does remain the central and pivotal point of professional preparation.

PROBLEM STATEMENT

The problem is to evaluate the curricula of the USCGA on the basis of junior officer performance criteria and sound educational criteria, and to make recommendations for changes, if needed, that will result in curricula precisely tailored to the requirements of the USCG for a continuing flow of competent officers, highly motivated and thoroughly educated and trained, for the period extending to 1982.

The objectives of this research are to insure that the training and educational needs of the service are met as fully as available resources permit, and that the full efforts of the Academy are directed to the attainment of these objectives in a cost-effective manner. The essence of the problem, simply put, is to assure a carefully balanced relationship between the educationa and training needs of the service and the educational and training curricula of the Academy.

PROPOSED SOLUTION

The solution to the problem was sought by comparing the professional performance requirements of the Coast Guard officer with the curricular functions of the Academy. This analytic comparison yielded two categories of recommendations for change: (a) *additions* to the curricula when it was determined that a need for education or training exists unfilled, and that this need can best be filled at the Academy, and (b) *deletions* from the curricula when it was determined that education or training exists for a task that is no longer a part of the job requirements or could better be accomplished elsewhere.

The proposed solution involved accomplishing work toward three objectives. The first was to analyze USCG junior officer performance requirements in order to determine what educational and training objectives are required for the USCGA. Concurrently, the Coast Guard was conducting an in-house study to identify officer billet requirements during the period 1972-1982.[1] Although the results of this billet survey did not indicate the types and number of graduate and undergraduate degrees required, it was of value in determining the parameters of the representative sampling required for the job task inventory. In addition, long-term service requirements, as developed by the Board of Senior Coast Guard Officers and reflected in the Long Range View,[2] serve as a second major component in determining educational and training requirements. Finally, a job-task questionnaire was developed, administered to 548 USCGA graduates, and analyzed to yield a comprehensive description of the current military functions and naval skills of critical importance to junior Coast Guard officers.

In summary, the first objective was to analyze performance requirements as indicated in the Rice Study, the Long Range View, and a job-task questionnaire in order to determine what educational and training objectives are required for the USCGA.

The second of the three objectives was to provide functional descriptions of the curricula of the USCGA, in order to determine what training and educational requirements are being met. The Academy curricular system is composed of several subsystems. These include the undergraduate educational programs in General Engineering, Ocean Engineering, Marine Engineering, Civil Engineering, Electrical Engineering, Nuclear

[1] "A Study to Determine the Future Commissioned Officer Requirements of the United States Coast Guard: 1972-1982" (the Rice Study), 1972.

[2] "Long Range View of the Coast Guard (Revised)" 13 August 1971.

Engineering, Mathematics, Computer Science, Economics and Management, and History and Government; the fields of Military Discipline and Career Indoctrination; Athletics; Cruises; the Military Science Courses; and the Nautical Science Courses. A systematic review of these curricular subsystems and their special educational and training objectives has provided a functional description of the curricula of the USCGA.

The third of the three objectives was to prepare an evaluation of the ability of the current curricula to meet the future needs of the service and to make recommendations for deletions and additions to the curricula. The essence of this objective was to compare the results of the analyses of the educational and training requirements with the functional description of the curricula of the Academy.

TECHNICAL REQUIREMENTS

The technical requirements were described in RFP CG-22, 532-A and in the notice, Study to Evaluate and Make Recommendations for Changes, as Needed, to Curricula in the USCGA, in the 15 December 1971 issue of Commerce Business Daily. These requirements covered the inputs to the project, the processes to be used, and the end products.

Inputs. The specified inputs to the project were three: (a) results of the Rice Study to identify officer billet requirements during the period 1972-1982; (b) the Long Range View document, which sets forth, in general terms, the objectives and direction of Coast Guard activities over the next ten years; (c) inputs from officials, at the Academy and at Coast Guard Headquarters, who were designated to serve as technical liaison personnel.

Processes. The specified processes used in the project were two (a) development of the job-task questionnaire (covering both Military Leadership and Naval Sciences) in a format compatible with job-task analysis procedures used by the Air Force (including compatibility with data analysis using the CODAP 1360 program), and (b) development of educational and training objectives, using a systems engineering approach and sequential steps similar to those outlined in CONARC Regulation 350-100-1.

End Products. The specified end products, or reports, were of three types: (a) monthly progress reports; (b) an interim report of total officer training and educational needs, as determined by questionnaire data, service requirements, and the needs of career Coast Guard Officers; (c) a final report that includes a description of activities performed, an evaluation of the ability of the present curricula to meet future officer service requirements, and recommendations for changes in the present Academy curricula to enable the Academy to provide the education and training required for future career officers.

Section 2

RECOMMENDATIONS

This study has found the Academy to be responsive to the needs of the USCG, and the graduates of the Academy to be remarkable men, who epitomize those characteristics described in the statement of mission. In addition to those characteristics, these men have turned their alert minds and their loyalty toward the resolve to make the Academy more than responsive; they would have an Academy that *anticipates* the needs of the service. In conversation and in interview, as well as in responding to the JTIQ, the officers of the USCG have gone beyond cooperation and the sharing of information. They have offered innovative ideas and revealing insights into the acquisition and employment of skill and knowledge. Because of their clear resolve, their cooperation, and their general spirit of good intention, the translation from data into recommendations has been facilitated.

WHAT IS BEING TAUGHT? (Recapitulation of Chapter 4)

Academics. The current four-year college level program at the Academy culminates in a Bachelor of Science degree. There are 13 curricular options. To the extent that the option program is turning out specialists (as contrasted with single course-of-study generalists), the *what* in "What is being taught?" is plural. There is diversity across curricula (as well as diversity within a given curriculum).

The objective of the four-year program at the Academy is to prepare the individual students for diverse careers in the USCG. Immediate and long range goals are being anticipated: The student must be prepared for (a) eventual acceptance into, and successful completion of, postgraduate education, (b) immediate job-entry with appropriate intellectual knowledges and skills and (c) professional growth in an occupation within the USCG.

Athletics. The physical education classes, intramural athletics, and intercollegiate athletics at the Academy provide an excellent opportunity to develop prowess, cooperation, and competitiveness, and much of the athletic program provides a basis for developing a lifelong (carry over) interest in physical fitness. Rules and technique are taught, practice is required, and maintenance of physical fitness is advocated.

The goal of the athletic program is to bring each cadet up to an acceptable standard. Skills in self defense and aquatic competence must be acquired. Health and physical fitness, as earnable goals, must be achieved. Good sportsmanship and fair play must be demonstrated.

Non-Academics. The Professional Studies Program teaches seamanship, law, navigation, communication, and weapons systems. The goal is to acquaint the cadet with roles he is likely to assume after graduation. The course-work in the professional studies program lays the foundation for meaningful practice during the Summer Training Program.

The Summer Training Program, in addition to providing practice in seamanship and related areas, is devoted to training cadets in the skills required for leading men.

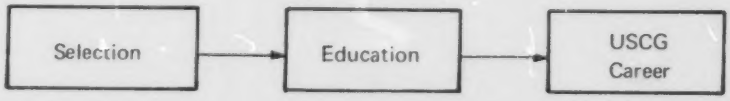
The Cadet Administration Division Program offers a traditional military academy approach to the development of leadership and professional military behavior. As such, it inculcates *esprit de corps* (within each class) and authoritarian leadership.

The nautical, naval, military, and leadership knowledges and skills, in sufficient detail to get the graduate on-board in his first assignment and to lay a foundation for a career in the Coast Guard, need to be acquired at the Academy.

RECOMMENDATIONS FOR ACADEMICS

Candidates for the Academy are selected in open competition. There are no exceptions to the cutting score, and there are no geographic quotas. The cadets come to the Academy with leadership potential, good character, and academic ability; that is, they come to the Academy after having been assessed and found eligible and acceptable.

While it is not directly relevant to the objectives of this study, the following commentary is pertinent to the discussion. Cadets come to the Academy with some generalized concept of the USCG that includes an overall system of education and training at the Academy:



The current four-year college level program at the Academy culminates in a Bachelor of Science degree. There are 13 curricular options offered. These options are not majors, in the traditional sense, and the BS is an undifferentiated degree. Nevertheless, the 13 options are in fact very different and differentially difficult courses of study. The options involve different education and training, and lead to competencies in different professions.

Two considerations that are important to the cadets and should be important to curricular planners have surfaced. First, students taking very unlike courses compete on a single, highly critical rank ordering of class standing. Second, students completing very different courses will not find their respective professional competencies equally in demand.

Of course, a multitude of other factors are involved in the decision-making process that the cadet must work his way through (e.g., his own talents, values, and ambition) before selecting his option, but obviously, the cadet *must* consider his chances in class standing and his prospects in his chosen profession.

It is recommended that every effort be made by the USCG to make sure that cadets do not disproportionately choose options that lead to relatively easier academic achievement and that lead to USCG occupations that are in relatively lesser demand.

In the following pages HumRRO makes a number of recommendations for modifications to the curricula at the USCGA. In some cases the recommendations are quite specific. In other cases the recommendations offer the USCG the opportunity to make decisions based on significant factors not within the scope of the present study. This approach follows the specific guidance given HumRRO by the USCG.[1] Academy courses

[1] See letter from USCG - G-P-1/73 [J. Cowan] to HumRRO dated 24 August 1973.

are identified by computer number and fall into eight general categories:

1000 - 1999 Engineering
2000 - 2999 Humanities
3000 - 3999 Mathematics
4000 - 4999 Physical Education
5000 - 5999 Physical Science
6000 - 6999 Professional Studies
7000 - 7999 Computer Sciences
8000 - 8999 Economics/Management

Courses: Deletions. In order to identify courses that were candidates for deletion from the curricula, two types of assessment were conducted. First, the results of the JTIQ, the Rice Study, and the Long Range View document were reviewed for course implications. However, this was a problem in that these instruments were all designed to identify requirements, and only by inference did they indicate non-requirements. For example, the research did not directly indicate that a course entitled "Colonial America" (No. 2331) should be dropped from the Academy curricula, although from the research results there was generally little support for Humanities courses of this type.

A second significant determinant that was used to identify candidates for deletion involved courses available within the elective system. The elective system serves either of two functions: (a) elective courses may augment a specialized course of study, and provide a greater expertise in that area (analogous to a psychologist taking a course in Freud), or (b) elective courses may balance a specialized course of study, and provide greater breadth of knowledge, that is, in different areas (analogous to a psychologist taking a course in Chaucer). Both functions have realistic demand characteristics. The full catalog of courses (excluding highly specialized courses and courses that require prerequisites) for any college describes the elective system elements. Courses, *qua* elements in an elective system, serve only to the extent that they are elected.

Since it is recognized that there are factors beyond the scope of the present study that may require the teaching of a specific course at the Academy, the following courses are presented as candidates for deletion from the curricula. It is suggested that the list be reviewed by the Coast Guard and the courses be retained only to the extent that they (a) meet a specific Academy need (e.g., are required for accreditation purposes) and/or (b) are being elected with significant frequency.

List I

Candidates for Deletion

No.	Course Title
1373	Directed Studies in Engineering
1374	Directed Studies in Electrical Circuit Design
1461	Electromechanics
1469	Antennas and Transmission Lines
1490	Automotive Systems Analysis
2105	French I
2106	French II
2107	Spanish I
2108	Spanish II

No.	Course Title
2205	French III
2206	French IV
2207	Spanish III
2208	Spanish IV
2301	Advanced Composition
2311	Classical Foundations of Western Thought
2312	The Western Tradition in Literature
2315	Three Major English Authors
2321	The American Experience in Literature
2323	Contemporary American Literature
2331	Colonial America
2333	The Civil War and Reconstruction
2337	New Deal, Fair Deal and After
2344	Modern European Literature
2354	Modern European History
2356	Modern Russian History
2357	Modern Asia
2358	Political History of Latin America
2362	American Political Parties and Interest Groups
2363	American Constitutional Development
2364	Urban America
2367	International Relations
2368	International Organizations
2371	Applied Psychology
2400	Selected Literary Topics
2402	Science and Society
2431	American Maritime History
2461	Western Political Theory
2465	Military Policy
2466	Peace and War in the Nuclear Age
2530	Independent Study in History
2560	Independent Study in Government
2570	Independent Study in Psychology
3111	Calculus and Analytic Geometry I Honors
3112	Calculus and Analytic Geometry II Honors
3211	Multivariable Calculus Honors
3321	Complex Variables and Applications
3336	Algebraic Structures II
3353	Deterministic Models
3355	Mathematical Programming
3361	Mathematical Statistics
3363	Stochastic Processes
3381	Mathematical Logic
3391	Directed Studies in Mathematics

No.	Course Title
5105	Physics II Self Paced
5111	Physics I Honors
5113	Physics II Honors
5121	Introductory Geology
5203	Physics III Self Paced
5215	Physics III Honors
5245	Chemistry II Self Paced
5247	Chemistry I Self Paced
5261	Chemistry I Honors
5263	Chemistry II Honors
5426	Observation-Survey Techniques
5555	Physics Tutor
5556	Chemistry Tutor
6414	Legal Affairs
6425	Criminal Justice: Military and Civilian
6462	Military Law
6465	The Bill of Rights in Contemporary Society
8211	Introduction to Management
8321	Intermediate Microeconomic Theory
8322	Intermediate Macroeconomic Theory
8331	Managerial Information and Control
8332	Financial Management
8341	Money and Banking
8342	Public Systems Analysis
8351	Operations Research
8352	Operating Systems Analysis
8361	Econometrics
8363	Structure of American Industry
8372	Managerial Environment
8381	International Trade and Finance
8401	Seminar in Economic Research Methodology
8402	Directed Studies in Economics
8411	Seminar in Management Research Methodology
8412	Directed Studies in Management

Courses: Additions. The Academy, in its desire to be responsive to academic needs and to become anticipative of service requirements, plans to add courses as different roles are demanded of the graduates and as new roles are thrust upon the service. Some of these courses will be added as new components of education and training in existing curricula (i.e., within options), others will be added as offerings of general interest (i.e., as electives).

Occasionally, *course addition* will need to take the form of *course revision*. Where an existing course touches on the topic of a needed course but does not itself, as constituted, meet the needs of the service, that course may require revision.

The possibility of course addition through course revision has surfaced in this study because the data show a need for several courses that the catalog shows as extant. It is possible that the courses in the catalog do meet the service needs; the data reflect educational and training requirements for officers who graduated several years ago. More generally, course additions are made to fill out options and to round out electives.

The USCG is hard pressed to meet the total education and training needs of the service. It cannot meet them all through the use of the Academy alone. There are, in fact, many areas where the Academy simply is not the logical site of preparation. Ocean Science, Nuclear Engineering, and Chemical Engineering are better relegated to other institutions, as are Communications and Operations Research/Systems Analysis. All of the graduate level courses are more appropriate for large universities. The following recommendations are made with the significant reservation that the Academy has strict limitations in time and so forth, within which it must meet some of the needs of the service. Based on the JTIQ, the Rice Study, and the Long Range View, it is recommended that the courses in List II be considered for addition to the curricula at the USCGA as general courses. However, some of them are also recommended under suggested options.

List II gives course titles. It is well established in educational circles that course titles do not definitively reflect the content of the course. However, the RFP specifically *excluded* course content as an area for this research and thus the research team can only offer guidance in this area at the course title level.

List II

Candidates for Addition

Course Title

Administration
Advanced Economics
Advanced Fluids

Basic Marketing
Basic Research Methods
Business Policy

Chemistry of Water Treatment
Community Relations
Competition of Ideas in a Business Society
Constitutional Law - American Federal System & Rights and Immunities
Contracts and Specifications
Controls
Courts and Criminal Procedure
Creative Writing
Criminal Investigation
Criminal Procedures and Evidence

Digital Electronics
Drug Use and Abuse

Course Title

Electro-Magnetic Fields
Elements of Business Statistics
Environmental Biology
Environmental Control
Environmental Quality and Man

Finance in Business Enterprises

Hydrology

Industrial Waste Treatment
Instructor Training at USCGA
International Trade & Finance
Interpersonal Relations
Introduction to Criminology and Penology
Introduction to Environmental Resource Systems
Introduction to Industrial and Retail Security
Introduction to Law Enforcement
Introduction to Maps and Air Photos
Introduction to Public Administration

Law Enforcement Organization and Administration
Legal History
Logic

Managerial Finance
Marine Transportation
Mechanical Dynamics

Non-Linear Circuits

Optics

Patrol Administration
Personnel Management
Personnel Performance Appraisal
Port Management
Port Safety
Principles of Transportation
Problems in Transportation
Product/Operation Management
Public Administration
Public Speaking

Role Differentiation (Superiors, Self, and Subordinates)

Social Psychology
Soil Mechanics
Speed Reading Course
Survey of Organized Crime
Systems Analysis

Course Title
Technical Writing
Treatment of Waste Water
Transportation Geography
Transportation Research Methods
Water and Waste Water Analysis
World History

Options: Deletions. The option program at the Academy is a step toward fully recognizing the diversity of professional competencies required within the USCG. Preparation for diversity is extremely difficult. Underspecialization, for the individual, leads to poor job performance; overspecialization, for the individual, leads to poor job opportunities. The option program tries to follow the middle of the road—a modicum of specialization after a general educational base. There is no easy rule of thumb for how many options should be offered. It is desirable to try to keep the number at a minimum while keeping the effectiveness at a maximum. The data do not specifically indicate that there are too many options, either for the size of the USCG or the size of the USCGA.

Also, the research team was told on many occasions by personnel at the Academy that humanities and similar nontechnical-type options are needed in a curriculum in order to attract a sufficient number of applicants. Since selection of cadets was not an area of study for the HumRRO-conducted research, no quantitative data were gathered to support this contention.

Nevertheless, *the data do not* indicate a service requirement in support of five options: History/Government, Economics/Management, General Engineering, Nuclear Engineering, and Ocean Science. Should these options be deleted, the appropriate option course offerings should also be deleted.

The reasons for these recommendations are discussed in other sections of this report. In summary, both of the humanities options (History/Government, Economics/Management) are not supported by the JTIQ results, the Rice Study, or the Long Range View. General Engineering and Nuclear Engineering are not supported by the JTIQ results, although the Rice Study does project a requirement for Nuclear Engineers. We feel that, when officers of this particular profession are required, selected officers should be sent to a postgraduate school to major in this area. Ocean Science, although admittedly an area with significant potential importance, is a specific career field and appears with relatively less frequency than do other billet requirements. As will be discussed in the section on suggested additions to the curriculum, it is felt that a more general environmental option should be offered at the Academy, and officers majoring in the general option could then attend postgraduate school and major in specific subjects (e.g., Ocean Science), as requirements for them are developed by the USCG.

It is recommended that the following options be considered for deletion from the curricula of the USCGA:

(1) History/Government
(2) General Engineering
(3) Economics/Management
(4) Nuclear Engineering
(5) Ocean Science

Options: Additions. The option program at the Academy, within reason, must grow in direct proportion to growth of differential training and educational requirements

imposed upon the Academy by service needs. The data from the JTIQ, the Rice Study, and the Long Range View, clearly indicate a need for two additional areas of professional competence: Environmental Protection (to include elements of ecology, oceanography, aquaculture, etc.) and Maritime Procedures (to include elements of marine law enforcement, marine transportation, port safety, etc.)

It is recommended that the following options[1] be corsidered for addition to the USCGA:

(1) ENVIRONMENTAL PROTECTION (Suggested Title)

Typical courses in these programs are:

Environmental Quality and Man
Treatment of Waste Water
Industrial Waste Treatment
Environmental Resource Systems
Environmental Biology
Environmental Control
Water and Waste Water Analysis
Chemistry of Water Treatment
Physical Oceanography
Aquaculture
Advanced Water Treatment Operation
Environmental Engineering Design
Water Quality Management
Environmental Resource Systems
Urban Environmental Problems
Estuarine Systems
Pollution Transport Problems
Aquatic Microbiology
Biology of Aquatic Systems
Environmental Chemistry
Advanced Water Analysis
Principles of Water Chemistry
Radiation Protection Engineering
Electronic Product Pollution
Basic Problems in Occupational Health and Industrial Environments
Atmospheric Pollution
Environmental Instrumentation
Air Pollution Sampling and Analysis
Environmental Meteorology
Environmental Micrometeorology
Ecological and General Systems
Solid Waste
Analysis of Solid Wastes
Design of Solid Waste Management Systems

[1] It is known that the USCGA currently teaches some of these courses. However, since comparison of course content was *not* an area of research for this study, no accurate assessment can be made as to specifically how many course changes are required to incorporate these options in the current curriculum.

(2) MARITIME PROCEDURES (Suggested Title)

Typical courses in these programs are:

Transportation Engineering
Port Management
Port Security/Safety
Marine Economics
Marine Transportation
Marine Laws and Treaties
Maritime Geography
Merchant Marine Systems
Marine Transportation Research Methods
International Trade and Finance
Marine Courts and Criminal Procedures
Merchant Marine Vessel Inspection
Human Factors Engineering
Computer Simulation Systems
Marine Communications
International Relations
National Law Enforcement
International Marine Law Enforcement

RECOMMENDATIONS FOR ATHLETICS

Candidates for the Academy are screened for physical vigor and stamina, and all cadets must qualify on a vigorous medical examination. The athletic program at the Academy, as previously noted, is guided by a "whole-man" philosophy. By firm efforts in selection and training, the Academy has attempted to be successful in producing physically able junior officers. The Academy has succeeded in producing physically superior junior officers.

Neither in interview nor in JTIQ data did the staff of this project hear the athletic program faulted. Direct observation of the program in action and conversation with the leaders of the program reinforced the conclusion that the HumRRO recommendation must be, as it is, "steady as you go."

RECOMMENDATIONS FOR NON-ACADEMICS

The USCG, in the RFP for this research, stated that ". . . the Coast Guard has identified all of the primary training objectives or criteria which the Academy program must satisfy." In general outline, the first of these concerns the service requirements for officer manpower (qualitative and quantitative billet requirements), the second is concerned with military leadership, and the third is concerned with naval sciences.

The second and third of these should be common to all officer personnel. (Conversely, different billets will require differential preparation for both job entry and professional growth.) That is, USCG officers, across all billets, should have a minimal competence in, and familiarity with, the knowledges and skills associated with military leadership and naval sciences. The minimal acceptable standard would be the mark of a professional in the Coast Guard officer corps.

Preparation for military leadership and in naval sciences at the Academy consists of three or four interfacing parts: the Summer Training Programs, the Cadet Administration Division Program, the Professional Studies Program, and supportive academic courses. The first two are specifically oriented toward leadership and seagoing skills. The Professional Studies Program is charged with imparting technical knowledges and skills to cadets and, thereby, enhancing their ability to establish valid authority relationship with their subordinates after commissioning. The academic courses that support the development of leadership skills, by helping to produce an understanding of human behavior and formal organizations, are the current management and psychology courses.

Evaluation of the non-academic training program at the Academy is fraught with difficulties. One difficulty lies in the lack of specificity in criteria, another lies in the lack of continuity in program objectives (the lack of continuity in executive positions), and finally, there is a difficulty in understanding the effect of these programs on the officers.

The reactions of active duty personnel to the non-academic training they received at the Academy have been sought both in interviews preceding the development of the Job-Task Inventory Questionnaire and in the interviews conducted for the purpose of leadership analysis. When queried about their leadership training at the Academy, officer personnel generally did not recall having received any. They did remember having had Saturday morning sessions, but did not strongly associate these sessions with training for leadership.

When these officers were queried about the Summer Training Programs, the responses were negative. The summer programs did not receive favorable comment in any of the more than 100 interviews that were conducted during the course of this project. It is not clear why this is so. One possibility is that the officers interviewed are evaluating their summer experiences in view of an after-the-fact expectation that the Summer Training Programs should have done more to help in preparing them for their active duty responsibilities. This possibilty is suggested by comments in the interviews that the conditions of the summer cruises are not the same as those pertaining to active duty aboard ship after commissioning, and that they present a picture of the Coast Guard which is inaccurate.

The past Commandant of Cadets began a process of making highly significant positive changes in objectives, in philosophy, and in procedures. Two changes are noteworthy. The first is the development of leadership training objectives. (While leadership skill is more difficult to assess than almost any other skill, the best in modern instructional technology suggests that instruction based on training objectives is likely to be more effective than instruction that is not.) A second major innovation is an effort to conceptualize the overall development of the cadet from the beginning of his fourth class summer until his commissioning, in terms of systematic framework against which to measure the cadet's progress at various points in his development. (The formal set of developmental criteria is likely to result in a significantly better set of benchmarks for performance counseling during development.)

It is to be hoped that improvements like those begun by the past Commandant of Cadets will continue. However, two considerations make the situation less than optimal. First, there is a serious lack of continuity in the program; the past Commandant of Cadets held that post for only 20 months. Second, the non-academics (exclusive of athletics) are fragmented into three divisions; the program is powered by a troika. This factor magnifies the negative effects of lack of continuity.

It is suggested that positive improvements would be facilitated by increasing the tenure of those responsible for development in military leadership and naval sciences, by assigning cadre under the direction of one senior line officer, and by reorganizing all efforts in concert with a set of explicit job-relevant objectives.

The Academy is attempting substantial man-building and character-forming purposes throughout the four-year program. It is suggested that these purposes might be served within a context that presents realistic preparation for a generalized initial duty assignment and relevant preparation for growth as a career officer. It is possible that these purposes will be best served by continuing the spirit of innovation that has recently stimulated the review of objectives, procedures, and organization.

It is recommended that the non-academics program continue to "turn to," and be responsive to the spirit of the recommendations in the interim report: "Recommendations Concerning Methods and Media Appropriate to Leadership Training and Education at U.S. Coast Guard Headquarters and the USCGA," by T.O. Jacobs, HumRRO Division No. 4, May 1973.

THE FUTURE

The support and effort for this research project testify to the reality of the desire to have Academy curricula that are responsive to, and anticipative of, service needs. It would seem that the goal is not simply to revise the curricula, once, now, for this decade, and be done with it. The goal is to keep tuning the Academy to the needs as they change and, equally as important, to keep track of the totality of educational and training requirements for the officer corps.

This study and the context within which it was formulated have provided models of data collection that can be adapted to a system of monitoring needs. These models include:

Billet Survey (qualitative and quantitative)
Survey of Graduate Students
Forecast of USCGA Diversification (Rice Study and Long Range View)
JTIQ

It is recommended that the USCG *continuously* review the educational and training requirements for the officer corps, with special emphasis on those requirements that are appropriate to the USCGA.

Section 3

ACTIVITIES PERFORMED

The methodology and sequencing of the project are described in this section, in sufficient detail to convey the spirit of the research effort.

SYSTEMS APPROACH

In general terms, the approach was a systems-analytic methodology. The term "systems approach" and its synonyms cover many meanings; all emphasize that problem solving involves an adequate description of the total system in which the problem exists. Every solution must be seen in the perspective of a meaningful context. That is, the solution must reflect a recognition that the element affected is one of a number of components that work together to serve a larger purpose. Because the components interact and are functionally related to a larger purpose, the systems approach is a functional analysis. After analysis, each of the components can be studied or manipulated by methods appropriate to it, and the impact on the system can be evaluated as that component is again built into the system.

The systems-analytic approach has provided an explicit and flexible method of study. With all of the components of the system openly described, new solutions to old problems may be stimulated. The traditional methods used to attack individual problems can be employed more effectively when a more adequate description of a problem in its context is available.

The epitome of applicability of a systems engineering approach is the challenge to meet the personnel requirements of military systems. A systems-analytic approach illuminates the recruitment, selection, and training problems associated with maintaining operational groups. Various techniques are available, but the basic model pivots around a full description of exactly what the personnel requirements are.

A systems engineering approach to curriculum development follows the generic model closely and, by defining and describing the operational or projected system, relates the scope of the training effort in terms of missions and goals. Of course, the general statement of the mission of military organizations implies a huge supersystem. The elegance of the systems approach is that supersystems are analyzed into systems, systems are analyzed into subsystems, subsystems are analyzed into components, and so forth. The terminology should not obscure the issue—the actual words are simply labels for classification. The point is that any complex element in one system can itself be treated as a system, with systematically related parts. This concept of a hierarchy of systems permits the investigation of one integral system at a time, without the attempt becoming immobilized by infinite complexity. In this way, even the largest of organizations or programs becomes conceptually manageable.

Use of a systems approach in designing a curriculum provides that (a) the course itself will always be viewed as being in a functional relationship with a larger system, (b) the content of the course will be explicitly related to training job-oriented behaviors, and (c) the evaluation of the course will be in terms of the objective assessment of terminal training and education objectives.

RESEARCH STRATEGY

The systems engineering approach proposed for usc on this project has followed the sequential processes outlined in *Systems Engineering of Training (Course Design)*, U.S Continental Army Command Regulation 350-100-1:

(1) Job Analysis
(2) Training Tasks
(3) Training Analysis
(4) Training Materials
(5) Testing Materials
(6) Conduct of Training
(7) Quality Control

The steps outlined in this regulation are essentially the same as those reflected in other standard course design manuals such as Rundquist, 1967 and 1970, and Hunter *et al.*, 1969.

The plan was to carry out the research inherent in the first three steps (the job analysis, the selection of training tasks, and the training analysis). The last four steps (training materials, testing materials, conduct of training, and quality control) are beyond the scope of this project.

Job Analysis

The initial step in the systems approach to curriculum development was to complete a job analysis, to identify performance requirements. The analysis was a listing of the observable acts and behaviors required of job incumbents, and consisted of two operations: (a) identifying the job and (b) developing a task inventory.

Identifying the Current Job. In many cases, training programs are developed to fill a specific need for training men to do a particular job, operate a given apparatus, or maintain special equipment. The identification of the job is given in the mission of the course. In contrast, the mission of the USCG Academy is to develop selected personnel to be officers who will be capable of performing duties appropriate to their grade. The requirement for systems engineering assumes that education and training are job-functional.

The identification of positions assigned to graduates of the USCGA was prerequisite to a job analysis. In this project, job analysis is made especially complex by the number of different kinds of positions held by graduates. The preliminary (unofficial) results of the billet survey clearly indicated the numerosity of jobs and provided a basis for setting the parameters (defining the characteristics) of the representative sample to be surveyed (interviewed).

Task Inventories. In the systems engineering approach to course design, an inventory of tasks found in the identified jobs forms the second part of the job analysis. The tasks inventoried determine the content of the training. These task statements must, therefore, be specific and concrete, denoting observable acts and behaviors performed by incumbents.

The task inventories were developed, first, by drawing from authoritative references (Coast Guard and other services), secondly, by interviewing the Coast Guard personnel, and finally, by the administration of a job-task inventory questionnaire (JTIQ). The completed task inventory listed 678 task statements within 19 task areas. The task statements were simple, declarative sentences organized in the form of an outline.

CODAP Programs. Two types of job-task data were collected during the inventory of individual jobs: (a) biographical and identification data, and (b) job inventory data. The

job inventory data specify (a) the task areas that the respondent performs, (b) the specific tasks within each area that the respondent performs, (c) the relative importance of the tasks performed, and (d) the relative need for preparation before commissioning.

Job-task inventory data were analyzed through a set of CODAP programs which provided summary data on two topics: the importance of the tasks, and the need for preparation for the tasks.

CODAP was written to use the average amount of time spent performing tasks as the primary variable. However, the present research used Hemphill's *part of the position scale* instead. This scale reflects a combination of importance or criticality, as well as time spent. The computer printed out data on this scale just as if it were data on *worktime spent*. Two types of data are provided by the programs: (a) percent of the sample performing the task, and (b) percent of the position (where position is defined as all of the tasks performed by the sample).

The programs also provide data representing the judgments of the respondents as to the need for preparation prior to commissioning.

Training Tasks

The number of tasks inventoried in a given job usually exceeds the number of tasks that will be trained for in a formal school setting. Some reduction in number of tasks is necessary. The *tasks* must go through a judgmental process. Some of the inventoried tasks have occurred too infrequently to warrant formal training. (Of course, performance objectives that are highly essential and tasks that occur very frequently must be included in training.) Also, some of the tasks are not most appropriately trained for at the Academy. The judgmental process has been done cooperatively by project staff and Coast Guard liaison personnel.

Training Analysis

The tasks selected for training in the formal school setting rarely constitute a training program *per se*. A training analysis is necessary to convert or translate the descriptive job analysis materials into educational and training objectives.

The training analysis was accomplished following the procedures and requirements outlined in Appendix C, Training Analysis, of CONARC Regulation 350-100-1, System Engineering of Training (Course Design). Of especial importance to this development were student performance objectives, performance conditions and standards, knowledges and skills, and course structure.

SEQUENCING

An outline of the plan, in overview, shows a separation of effort into 10 activities:

(1) Consultation and Revision of Plans
(2) Development of Job-Task Inventory Questionnaire (JTIQ)
(3) Description of Academic Requirements
(4) Description of Academy Curricula
(5) Consultation and Review of JTIQ
(6) Administration of JTIQ and Analysis of Data
(7) Interpretation of JTIQ Data
(8) Combination of Job and Academic Requirements—Educational and Training Requirements

(9) Comparison of Requirements with Curricula, and
(10) Evaluation and Recommendations

An additional requirement was added, at the request of the Coast Guard, for a special report on methods and media by Dr. T.O. Jacobs.

The separate activities can be flow charted as shown in Figure 1.

Step 1. Consultation and Revision of Plans. The initial step, after the awarding of the contract, was to review and revise the plans. The review and revision was the joint responsibility of HumRRO and Coast Guard liaison personnel, but note must be made of four consultations that constitute substeps to Step 1:

1.1. Consultation with Captain McMullan, at Governor's Island, concerning the compilation of tasks to be used in the inventorying of military and nautical job-tasks of junior officers in the USCG.

1.2. Consultation with Dr. Rundquist, at U.S. Naval Personnel Research and Training Laboratory, concerning the adaptation of systems engineering techniques to the design of curricula requirements for leadership for junior officers in the USCG.

1.3. Consultation with Captain Rivard, at the Academy, concerning the categories of the substantive content of the job-task inventory questionnaire.

1.4. Consultation with the designated liaison personnel at the USCGA and at the USCG Headquarters.

Step 2. Development of JTIQ. The Job-Task Inventory Questionnaire was developed. The guidance provided by the consultants and liaison personnel determined the form of the JTIQ. The substantive content of the questionnaire was developed from information obtained in interviews with Coast Guard personnel at Pensacola, Boston, Cleveland, New York, and New London.

Step 3. Description of Academic Requirements. This step brought together those requirements necessarily imposed upon the educational and training curricula in order to assure (a) accreditation of the Coast Guard Academy by the New England Association of Colleges and Secondary Schools (NEACSS), (b) acceptance of Academy graduates by postgraduate schools, and (c) accommodation to the requirements for filling billets in the USCG (as indicated by the Rice Study and the Long Range View). This step was an integral part of the systems approach, making explicit all of the factors affecting the curricular system.

Step 4. Description of Academic Curricula. This step brought together the diverse functions of the Academy. This step was an integral part of the systems approach, providing an explication of the curricular subsystems. It is this curricular analysis that was compared with the totality of educational and training requirements.

Step 5. Consultation and Revision of JTIQ. This step provided an opportunity for review of the JTIQ, and revision as required. The essence of this step was to take the JTIQ to the consultant, Captain Rivard, and to the liaison personnel at the Academy and at Coast Guard Headquarters for review, to revise the questionnaire as necessary, and to submit the JTIQ to the USCG for administration.

Step 6. Administration of the JTIQ and Analysis of the Data. This step covered the activities of the USCG in administering the questionnaire to USCG personnel and in analyzing the data from the JTIQ, using the CODAP programs. The long turn-around time delayed Steps 7, 8, 9, and 10, and the completion of the project.

Step 7. Interpretation of JTIQ Data. This step was directed at interpreting the data from the questionnaire.

Step 8. Educational and Training Requirements. This step involved combining the results of Step 3, Description of Academic Requirements, and Step 7, Interpretation of

Flow Chart of Scheduled Activities

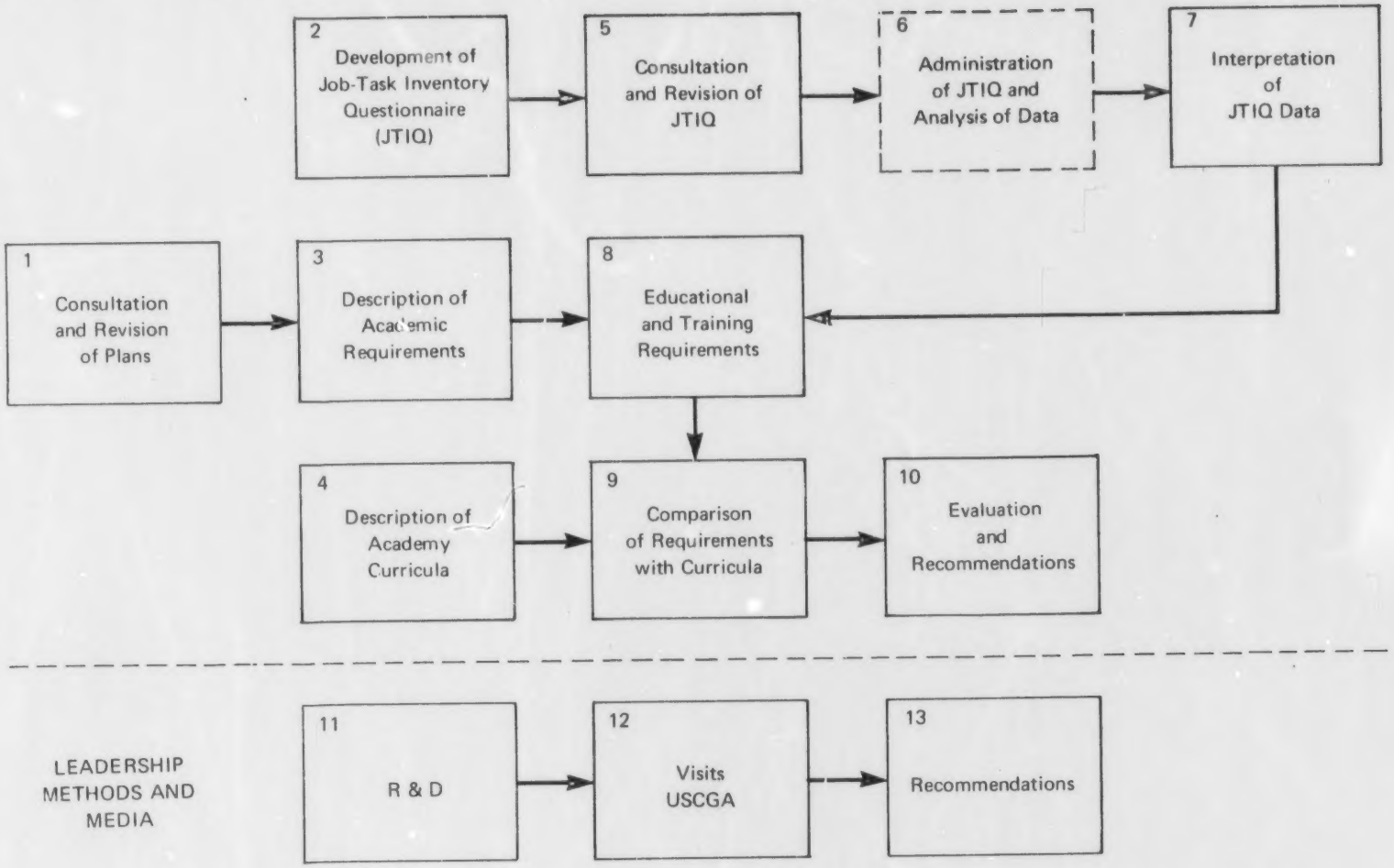


Figure 1

JTIQ Data, to form the totality of educational and training requirements. A written report describing total officer education and training needs was included.

Step 9. Comparison of Requirements with Curricula. The relevant training and educational requirements for USCG junior officers were compared with the functional description of the curricula at the USCGA. The Academy curricula are implemented in a four-year educational and training period, during which the student is presented with courses in military and nautical skills, basic and specialized professional occupational skills, and basic intellectual skills. To assess the adequacy of the curricula as a valid foundation for a USCG career, the curricula were examined in two general analyses—a comparative analysis and an evaluative analysis.

First, a comparison was made of the curricula with the job-task identified by the job-task inventory. (The inventory represented leadership and nautical skills that might be performed by an officer in any specialty, but the task descriptions themselves omitted reference to a specific specialty.) The comparative analyses involved determining whether each of the training requirements derived from the job-task inventory was represented as a course title or as a major heading in the description of the scope of a course. For those training requirements for which no curricular representation was found, an evaluative analysis was made. The *project* personnel determined, by systematic analysis, the importance of including the requirements in the curricula. Recommendation for additions to the curricula are based upon this rating.

Step 10. Evaluation and Recommendations. This step provided for writing the final report, which includes (a) a description of activities performed towards completion of the project, (b) an evaluation of the ability of the present Academy curricula to meet future officer service requirements, and (c) recommendations for changes in the present Academy curricula to enable the Academy to provide the education and training required for career officers.

Steps 11, 12, and 13 cover the supplementary requirement for recommendations concerning methods and media appropriate for utilization in leadership development. This requirement, which involved a semi-independent research effort from the main project, was completed in May 1973 and an interim report - "Recommendations Concerning Methods and Media Appropriate to Leadership Training and Education at the U.S. Coast Guard Headquarters and the USCGA," by T.O. Jacobs, was forwarded to both Coast Guard Headquarters and the USCGA.

COOPERATION

The completion of the project has required the full cooperation of the USCG. The project staff, although practiced in military and educational psychology, began with no thorough understanding of the USCG, its missions, and its personnel. This unfamiliarity has been counterbalanced by step-by-step cooperation with the USCG. A total of 25 face-to-face, cooperative, and informative on-site visits to CG installations have made the project possible. Sequencing and objective of these visits are as follows:

Visits to Gather Information on USCG

Dates	Place	Objective of Visit	Person(s) Contacted
Planning Visits			
2-4 May	New York City	To gather general background information on the USCG	Capt. Ira McMullan (USCG Ret.)
9-11 May	San Diego	To gather information on the systems analytic procedures for the development of educational programs	Dr. Edward A. Rundquist Consultant to HumRRO
16-17 May	USCGA	To gather general background information on the USCG	Capt. Ephraim Rivard (USCG Ret.) Consultant to HumRRO
16-17 May	USCGA	To gather general information on the USCGA	Capt. Roderick White Asst. Academic Dean USCGA
18 May	USCG HQ	To discuss the JTIQ data and identify potential data collection sites	Joseph Cowan Project Monitor USCG HQ
25 May	USCG HQ	To discuss the use of CODAP 360 programs for the data analysis	Richard Lanterman Asst. Project Monitor USCG HQ
Visits Concerned With Development of JTIQ			
28 May	Pensacola NAS	To pilot test a draft interview outline for the JTIQ	8 CG Officers
5-8 June	1st CG District HQ Boston	To gather job requirement information from CG personnel	21 CG Officers 4 CG EM (Chiefs)
12-14 June	9th CG District HQ Cleveland-Cheybogan	To gather job requirement information from CG personnel	7 CG Officers
19-22 June	3rd CG District HQ New York	To gather job requirement information from CG personnel	23 CG Officers
14-15 Aug	USCG HQ	To discuss the draft JTIQ	Mr. Cowan Project Monitor
14-15 Aug	USCG HQ	To discuss the analysis of JTIQ data	Mr. Lanterman Asst. Project Monitor
17 Aug	USCGA	To discuss the draft JTIQ	Captain White Asst. Academic Dean
Visits Concerned With the Development of Leadership Methods and Media			
28-30 June	3rd CG District HQ New York	To hold a workshop on leadership in the USCG at the junior officer level	5 CG Officers
11 July	USCGA	To discuss leadership at the USCGA	Captain Rivard Consultant

Dates	Place	Objective of Visit	Person(s) Contacted
11 July	USCGA	To discuss leadership at the USCGA	Cdr. A.M. Danielsen Acting Commandant of Cadets USCGA
1 Dec	USCGA	To discuss leadership at the USCGA	Capt. (now Admiral) John Hayes Commandant of Cadets USCGA
6 Apr	1st CG District HQ Boston	To gather leadership information from CG personnel	6 CG Officers 2 CG EM (Chiefs)
Visits Concerned With Analysis of the Current Academy Curricula			
12-13 Sept	USCGA	To collect information on the curricular functions at the USCGA	Capt. Paul Foye Academic Dean USCGA Captain White Asst. Academic Dean
15 Sept	1st CG District HQ Base Boston	To discuss a study of how the USCGA meets the requirements for admission	LCDR Wayne Stevens Executive Officer Base Boston (formerly Asst. to the Dean-USCGA)
1-3 Nov	USCGA	To collect comments on the draft paper describing the curricula of the USCGA	Captain Foye Academic Dean Captain White Asst. Academic Dean Captain Hayes Commandant of Cadets 6 Academic Department Chairman, USCGA
22 Jan	USCG HQ	To discuss the curricula of the USCGA	Capt. L.D. High, CMDR Paul Schroeder, LCDR Ted Lealand, all of PTP USCG HQ; Mr. Cowan
23 Jan	USCGA	To finalize the description of the current Academy curricula	Captain Foye Academic Dean Captain White Asst. Academic Dean

Dates	Place	Objective of Visit	Person(s) Contacted
Visit Concerned With Developing Information on USCG Post-Graduate Preparation			
5-7 Feb	U.S. Naval Post-Graduate School Monterey, Calif.	To develop information on preparation for PG school	16 CG Officers attending U.S. Naval Post-Graduate School
Visit Concerned With the Analyses of JTIQ Data			
9 Apr	USCG HQ	To discuss the analyses of JTIQ data	Mr. Lanterman Asst. Project Monitor

Section 4

CURRICULA OF THE U.S. COAST GUARD

The USCGA serves diverse functions. Describing these functions is an integral part of the systems approach, as it provides a statement of the nature and of the various curricular subsystems. This curricular analysis will be compared with the education and training requirements, and that comparison will answer the question: Can the Academy meet the educational and training needs of the USCG?

In order to accomplish its mission, the USCGA has established the following primary objectives:

(1) To provide, by precept and example, an environment that encourages a high sense of honor, loyalty, and obedience, and to motivate graduates to continue in the USCG for a full officer career.

(2) To provide a sound undergraduate education in a field of interest to the Coast Guard.

(3) To provide training that enables graduates to assume their immediate duties as Junior Deck Officers afloat.

Through the operation of a multi-faceted curriculum over four years, cadets are required to develop the intellectual, physical, and emotional qualities requisite to effective leadership performance. Concurrent with this development, they complete the requirements for a Bachelor of Science degree and are commissioned as Ensigns in the USCG upon graduation from the Academy.

A complete listing of the courses in the Academy curricula is given in Table 1. The courses are categorized by these numbers:

1000 - 1999	Engineering
2000 - 2999	Humanities
3000 - 3999	Mathematics
4000 - 4999	Physical Education
5000 - 5999	Physical Science
6000 - 6999	Professional Studies
7000 - 7999	Computer Sciences
8000 - 8999	Economics/Management

The cadets are exposed to five subsystems during their four-year stay at the Academy: the Academic Program, the Athletic Program, the Professional Studies Program, the Cadet Administration Division, and the Summer Training Program.

ACADEMIC PROGRAM

In the current four-year college level program at the USCGA, a common core of 25 required courses (Table 2) forms the framework for each of 13 curricular options: General Engineering, Ocean Engineering, Marine Engineering, Civil Engineering, Electrical Engineering, Nuclear Engineering, Mathematics, Computer Science, Physics, Chemistry, Ocean Science, Economics/Management, and History/Government. Enrollment in the various options is shown in Table 3. In all options, the first academic year is identical for all cadets. Toward the end of the first academic year, each cadet officially expresses a

Table 1

Courses in US Coast Guard Academy Curricula

No.	Course Title	Credit Hours (Per Year)
1170	Engineering Communication	2.0
1211	Mechanics	4.0
1219	Surveying	2.0
1312	Strength of Materials	3.5
1314	Fluid Mechanics	3.0
1315	Fluid Mechanics for Oceanographers	3.0
1316	Structural Analysis I	3.0
1317	Concrete Properties and Design	3.0
1321	Thermodynamics	3.0
1331	Mechanical Vibrations	3.0
1340	Introduction to Electrical Engineering	3.5
1343	Electrical Science I	3.5
1345	Circuits and Signals	3.0
1351	Electrical Science II	3.5
1367	Switching Circuits	3.5
1373	Directed Studies in Engineering	TBA[a]
1374	Directed Studies in Electrical Circuit Design	3.0
1416	Structural Analysis II	3.0
1417	Soil Mechanics and Foundation Design	4.0
1418	Civil Engineering Practices	4.0
1425	Steel Design and Analysis	3.0
1427	Timber Design and Analysis	2.0
1429	Water Resources Engineering	3.0
1431	Heat Transfer	3.0
1435	Materials Science	3.5
1453	Communication Systems	3.5
1455	Instrumentation	3.5
1461	Electromechanics	3.0
1465	Automatic Control Systems	3.0
1469	Antennas and Transmission Lines	3.0
1481	Ship Design I	4.0
1483	Ship Design II	4.0
1485	Basic Naval Architecture	3.0
1490	Automotive Systems Analysis	4.0
1491	Engineering Experimentation and Analysis	4.0
1493	Engineering Design and Analysis	4.0
1494	Ocean Engineering Design and Analysis	4.0
1495	Reactor Theory I	3.0
1496	Reactor Theory II	3.0
1497	Radiation Detection	3.0
1498	Nuclear Reactor Power Systems	3.0
1499	Propulsion Design and Analysis	4.0
2101	English Composition, Public Speaking and Literature	3.0
2105	French I	3.0

(Continued)

Table 1 *(Continued)*

Courses in US Coast Guard Academy Curricula

No.	Course Title	Credit Hours (Per Year)
2106	French II	3.0
2107	Spanish I	3.0
2108	Spanish II	3.0
2115	The Heroic Figure in Literature	3.0
2116	Literature and the Future	3.0
2117	Literature and the Sea	3.0
2121	American Biographical Writing	3.0
2131	Domestic History of the United States	3.0
2205	French III	3.0
2206	French IV	3.0
2207	Spanish III	3.0
2208	Spanish IV	3.0
2232	American Diplomacy and Foreign Policy	3.0
2261	American Government	3.0
2271	Human Behavior	3.0
2301	Advanced Composition	3.0
2311	Classical Foundations of Western Thought	3.0
2312	The Western Tradition in Literature	3.0
2315	Three Major English Authors	3.0
2321	The American Experience in Literature	3.0
2323	Contemporary American Literature	3.0
2331	Colonial America	3.0
2333	The Civil War and Reconstruction	3.0
2337	New Deal, Fair Deal and After	3.0
2344	Modern European Literature	3.0
2354	Modern European History	3.0
2356	Modern Russian History	3.0
2357	Modern Asia	3.0
2358	Political History of Latin America	3.0
2362	American Political Parties and Interest Groups	3.0
2363	American Constitutional Development	3.0
2364	Urban America	3.0
2365	Comparative Government	3.0
2367	International Relations	3.0
2368	International Organizations	3.0
2371	Applied Psychology	3.0
2400	Selected Literary Topics	3.0
2402	Science and Society	3.0
2431	American Maritime History	3.0
2461	Western Political Theory	3.0
2465	Military Policy	3.0
2466	Peace and War in the Nuclear Age	3.0
2530	Independent Study In History	3.0
2560	Independent Study in Government	3.0

(Continued)

Table 1 *(Continued)*

Courses in US Coast Guard Academy Curricula

No.	Course Title	Credit Hours (Per Year)
2570	Independent Study in Psychology	3.0
3100	College Mathematics	4.0
3101	Calculus and Analytic Geometry I	4.0
3102	Calculus and Analytic Geometry II	4.0
3111	Calculus and Analytic Geometry I Honors	4.0
3112	Calculus and Analytic Geometry II Honors	4.0
3201	Multivariable Calculus	3.0
3211	Multivariable Calculus Honors	3.0
3212	Probability and Statistics	3.0
3215	Differential Equations	3.0
3311	Advanced Calculus I	3.0
3312	Advanced Calculus II	3.0
3315	Advanced Engineering Mathematics I	3.0
3316	Advanced Engineering Mathematics II	3.0
3321	Complex Variables and Applications	3.0
3331	Linear Algebra	3.0
3335	Algebraic Structures I	3.0
3336	Algebraic Structures II	3.0
3351	Numerical Analysis	3.0
3353	Deterministic Models	3.0
3355	Mathematical Programming	3.0
3360	Probability	3.0
3361	Mathematical Statistics	3.0
3363	Stochastic Processes	3.0
3365	Design of Experiments	3.0
3381	Mathematical Logic	3.0
3391	Directed Studies in Mathematics	TBA
4101	First Year Physical Education	2.0
4201	Second Year Physical Education	2.0
4301	Third Year Physical Education	2.0
4401	Fourth Year Physical Education	1.0
4403	Fourth Year Skiing	1.0
4404	Water Safety	1.0
4405	Scuba	1.0
5101	Physics I	3.0
5103	Physics II	3.5
5105	Physics II Self Paced	3.5
5111	Physics I Honors	3.5
5113	Physics II Honors	3.5
5121	Introductory Geology	4.0
5203	Physics III Self Paced	4.0
5205	Physics III	4.0
5207	Modern Physics	4.0

(Continued)

Table 1 *(Continued)*

Courses in US Coast Guard Academy Curricula

No.	Course Title	Credit Hours (Per Year)
5215	Physics III Honors	4.0
5218	Introduction to Marine Geology/Marine Biology	4.0
5220	General Astronomy	4.0
5241	Chemistry I	4.0
5243	Chemistry II	4.0
5245	Chemistry II Self Paced	4.0
5247	Chemistry I Self Paced	4.0
5261	Chemistry I Honors	4.0
5263	Chemistry II Honors	4.0
5301	Oceanography I	3.5
5309	Nuclear Physics	4.0
5311	Electromagnetic Theory	3.0
5312	Optics/Acoustics	3.0
5315	Theoretical Mechanics	3.0
5321	Physical Oceanography	4.0
5326	Meteorology	4.0
5345	Organic Chemistry I	4.0
5347	Organic Chemistry II	4.0
5355	Physical Chemistry I	4.0
5357	Physical Chemistry II	4.0
5410	Waves and Tides	3.5
5414	Regional Oceanography	4.0
5416	Air-Sea Interaction	4.0
5418	Marine Pollution Ecology	4.0
5420	Biological Oceanography	4.0
5422	Chemical Oceanography	4.0
5424	Marine Fisheries	4.0
5426	Observation-Survey Techniques	3.5
5430	Introductory Quantum Mechanics	3.0
5432	Solid State Physics	4.0
5434	Experimental Methods	3.0
5435	Environmental Analysis	3.0
5436	Continuum Mechanics	4.0
5443	Astrophysics and Relativity	3.0
5446	Thermal Physics	4.0
5448	Inorganic Chemistry	3.0
5449	Instrumental Analysis	4.0
5453	Special Problems in Scientific Research	TBA
5555	Physics Tutor	1.0
5556	Chemistry Tutor	1.0
6101	Nautical Science I	3.0
6201	Nautical Science II	4.0
6301	Law I	4.0
6401	Law II - Maritime Law Enforcement	4.0

(Continued)

Table 1 *(Continued)*

Courses in US Coast Guard Academy Curricula

No.	Course Title	Credit Hours (Per Year)
6411	Nautical Science III	4.0
6414	Legal Affairs	3.0
6421	Nautical Science IV	4.0
6424	Law of the Sea	3.0
6425	Criminal Justice: Military and Civilian	3.0
6426	American Constitutional Law	3.0
6462	Military Law	3.0
6465	The Bill of Rights in Contemporary Society	3.0
7111	Introduction to Computing	3.0
7221	Computers and Programing	4.0
7231	Computer Methodologies	4.0
7321	Information Processing Systems	3.0
7351	Analytical Methods in Applied Programing	3.0
7361	Data Processing and File Management	3.0
7401	Directed Studies in Computer Science/Applications	3.0
7481	Computer Applications and Research Methodology Seminar	3.0
8201	Economic Principles I	3.0
8202	Economic Principles II	3.0
8211	Introduction to Management	3.0
8321	Intermediate Microeconomic Theory	3.0
8322	Intermediate Macroeconomic Theory	3.0
8331	Managerial Information and Control	3.0
8332	Financial Management	3.0
8333	Cost Accounting	3.0
8341	Money and Banking	3.0
8342	Public Systems Analysis	3.0
8351	Operations Research	3.0
8352	Operating Systems Analysis	3.0
8361	Econometrics	3.0
8362	Transportation	3.0
8363	Structure of American Industry	3.0
8371	Organizational Behavior	3.0
8372	Managerial Environment	3.0
8381	International Trade and Finance	3.0
8391	Transportation Planning and Policy	3.0
8401	Seminar in Economic Research Methodology	3.0
8402	Directed Studies in Economics	TBA
8411	Seminar in Management Research Methodology	3.0
8412	Directed Studies in Management	TBA

[a]To be announced.

Table 2

Coast Guard Academy Core Curriculum

Subject Matter Area	Number of Courses
Computer Science	1
Applied Science and Engineering	
Engineering Communication	1
Electrical Engineering	1 (2)[a]
Naval Architecture	1 (2)[b]
Professional Studies	
Nautical Science/Communication	2
Navigation	2
Weapons System	1
Law	1
Mathematics	3
Physical and Ocean Sciences	
Physics	3
Chemistry	2
Oceanography/Marine Biology and Geology	1[c]
Humanities	
Language and Literature	2
History	1
Government	1
Economics and Management	2

[a]The Chemistry and all Engineering options except Nuclear Engineering substitute a two-course sequence for the standard single Electrical Engineering course.

[b]The Marine Engineering option substitutes a two-course sequence for the standard single Naval Architecture course.

[c]The Ocean Engineering and Science options substitute Marine Biology and Geology for Oceanography.

preference for an option area and is assigned to an academic advisor in that area. With the assistance of the academic advisor, the cadet's program of study for the remaining three academic years is planned, in accordance with the requirements specific to his preferred option area.

The cadet may change his preferred option area with the aid of his academic advisor and cognizant option coordinators, upon the approval of the Dean of Academics. This type of change is feasible when the cadet plans to change to an option where the academic requirements overlap his currently preferred option to a significant extent.

In order to successfully complete an option program of study, the cadet must meet both core (see Table 4) and option requirements, and must complete elective courses in certain non-option areas. All Engineering options require the cadet to complete course-work in Mechanics, Strength of Materials, Thermodynamics, and Differential Equations. In addition, these options (except Nuclear Engineering) substitute a two-course Electrical Engineering sequence for the single Electrical Engineering course prescribed by the core curriculum. Finally, all Engineering options require cadets to complete at least one

Table 3

Percentages of Classes Enrolled in Option Plans
(March 1973)

Option	Class (%)		
	1974	1975	1976
General Engineering	4	4	6
Ocean Engineering	6	4	7
Marine Engineering	4	4	4
Electrical Engineering	4	7	7
Nuclear Engineering	2	5	1
Civil Engineering	5	9	7
Mathematics	10	9	8
Computer Science	1	3	4
Ocean Science	7	15	20
Physics	3	2	2
Chemistry	4	4	4
History/Government	27	20	16
Economics/Management	21	13	13

additional higher level Mathematics course. This requirement is met either through the completion of a specific course (Civil, Ocean, and Nuclear Engineering), the completion of an elective Mathematics course (General and Electrical Engineering), or the completion of one of two specified Mathematics courses (Marine Engineering). These requirements form the basis of the Engineering options.

On the other hand, the Non-Engineering options do not have a general basis on which the more specific course requirements for these options are structured. However, several commonalities exist among these options: (a) Except Chemistry and Ocean Science, all options require the cadets to complete the standard core curriculum; (b) except History/Government and Economics/Management, all options require the cadets to complete two Socio-Humanistic electives; (c) except Mathematics, all options allow the cadets at least one free elective in addition to those provided by the core curriculum requirements.

The remainder of the course requirements for the individual Engineering options are oriented toward the acquisition of the knowledges and skills necessary for performing the tasks usually required of individuals who are designated as specific types of engineers—civil engineers, electrical engineers, or nuclear engineers, for example. While all of the Engineering options allow cadets to complete course-work in two Socio-Humanistic electives in addition to those provided by the core curriculum requirements, additional elective course-work is generally very limited (e.g., to a small number of Mathematics or Engineering oriented courses).

The remainder of the course requirements for the individual non-Engineering options are oriented toward the acquisition of the minimal knowledges and skills necessary for the practice of the professions associated with the individual non-Engineering options. In contrast to the Engineering options, elective course-work in the non-Engineering options is of substantial magnitude. Usually this elective course-work takes the form of two Socio-Humanistics electives, two free electives, or three related electives.

Table 4

Core Curriculum Requirements for Academy Options

	Ship Design I & II Substituted for Basic Nav. Arch.	Intro. Marine Bio./Geo. Substituted for Oceans I	Elect. Sci. I & II Substituted for Intro. Elect. Eng.	Standard Core Curriculum
Engineering Options				
General			X	
Marine	X		X	
Electrical			X	
Civil			X	
Ocean		X	X	
Nuclear				X
Non-Engineering Options				
Ocean Science		X		
Chemistry			X	
Physics				X
Mathematics				X
Computer Science				X
History/Government				X
Economics/Management				X

This analysis suggests that the set of Engineering options represents a highly structured, technically focused educational system which is apparently designed to give cadets pursuing these options a well-defined quantitative and methodological expertise. Similarly, the set of non-Engineering options represents an educational system which is designed to provide cadets with the professional expertise necessary for graduate study in the profession corresponding to their option.

Usually, individuals with a baccalaureate-level degree in Engineering who have completed some practical experience in Engineering are able to enter professional life and subsequently receive relatively little pressure to return to school for higher level degrees in their particular Engineering specialty. The undergraduate Engineering curriculum must be technically focused, if all of the basic requirements are to be acquired during a four-year academic period.

The non-Engineering professions, on the other hand, usually require their members to possess higher level degrees before they can practice their chosen discipline professionally. The undergraduate education of these individuals does not need to be technically focused, since most of them will return to school for further education. The four-year curricula for these professions can and must accommodate substantial variety. (The graduate schools profess a preference for a liberal arts education.)

Finally, it should be noted that both the Engineering and the non-Engineering curricula provide more than adequate preparation for future graduate study. This is especially true of the Engineering program with its heavy quantitative and methodological emphasis. However, due to the broadly based nature of the non-Engineering curricula, these programs also serve to prepare cadets for graduate education—not only in the fields associated with these options, but also in other related fields.

ATHLETIC PROGRAM

The athletic program at the USCGA consists of formal Physical Education classes together with intramural and intercollegiate athletics. Athletics are compulsory at the Academy and are as much a part of the education program as academics and miiitary indoctrination. The development of physical prowess and a competitive spirit not only are important for success at the Academy but should serve as the basis for a lifelong interest in physical fitness.

Physical Education

Physical Education (PE) is required for all cadets during their stay at the Academy. During the first, second, and third years the cadets participate in PE for three hours per week. Instruction for each sport taught during the first three years lasts for eight weeks. Training is continued long enough for the cadets to attain an adequate level of proficiency in each sport. During the final year, only one hour per week is required of the cadet.

The PE program is designed to provide a maximal development of strength, endurance, agility, and various basic physical skills. Aquatics are emphasized, as are those knowledges and skills that are developed as aids to personal protection. Although the primary interest of the PE department is physical fitness of the cadet, the development of interest and skill in a variety of carryover sports is also emphasized. Practice of these sports throughout the Coast Guard officer's adult life will serve to maintain his physical fitness and thus prolong his usefulness to both the Coast Guard and society at large.

The following sports comprise the physical education program:

First year - Foundations of Physical Activity; Survival Swimming; Gymnastics; Wrestling.

Second year - Tennis; Handball/Squash; Volleyball; Advanced Swimming.

Third year - Personal Defense; Golf; Life Saving; Badminton.

Fourth year - Tennis; Golf; Scuba; Handball/Squash; Badminton; Skiing.

Special remedial swimming programs and exercise programs are conducted for cadets who score low on entrance tests in swimming and physical fitness.

The first 10 minutes of each P.E. class period are devoted to physical conditioning exercises. Each cadet is tested on the knowledge and skill level attained in each physical education activity course. Each cadet receives a grade measuring his progress for the first half semester, the second half semester, and the bi-annual physical fitness test. All three numerical grades are added and the average is the final semester grade in physical education.

Intramural Athletics

All cadets (unless waivers are granted) must participate in either intramural or intercollegiate athletics during two of the three seasons of the academic year. Cadets who do not participate on varsity squads are required to compete in the intramural athletics

program. This program is organized and conducted by the Cadet Corps through its regimental organization and is supervised by the Director of Intramurals. The intramural program is considered to be an extension of the formal Physical Education classes. As such the program has as its objectives:

(1) Providing a competitive physical outlet for the cadets.
(2) Developing desire and courage in the individual.
(3) Developing and emphasizing strong intercompany rivalries.

The 10 sports offered in this program are divided among Fall, Winter, and Spring seasons. These sports are softball, touch football, tennis, aerial tennis, basketball, volleyball, handball, table tennis, soccer, and sailing.

In addition to these sports, single meets among companies are also held in rifle, pistol, and swimming. The program is conducted by the cadets and, in addition to various administrative responsibilities, the cadets also serve as coaches, managers, officials, and scorekeepers. An Athletic Commission, consisting of the above officers, maintains attendance records, acts as a protest review board, and recommends any required changes in the Intercompany Handbook. Besides having a positive psychological and physical impact on the Cadet Corps, competition in intramurals is enlivened by the availability of various types of company, team, and individual awards.

Intercollegiate Athletics

The intercollegiate athletic program involves that portion of the overall athletic program that is concerned with sports contests with other schools, colleges, and universities. Normally, Academy opponents are New England and/or New York state colleges or universities, although intersectional contests are occasionally scheduled. Some of the colleges and universities that maintain consistent athletic relations with the Academy are:

Amherst College
Bates College
Bowdoin College
Brown College
Colby College
Dartmouth College
Harvard University
Massachusetts Institute of Technology
Middlebury College
Norwich University
Rensselaer Polytechnic Institution
Trinity College
Tufts University
United States Military Academy
United States Naval Academy
University of Connecticut
University of Massachusetts
University of Rhode Island
University of Vermont
Wesleyan University
Williams College
Worcester Polytechnic Institution
Yale University

The Academy is a member of numerous athletic associations including the National Collegiate Athletic Association and the Eastern College Athletic Conference. As a member, the Academy must adhere to the rules of eligibility of the organizations.

The Director of Athletics is responsible for conducting the intercollegiate athletic program at the Academy in accordance with policies established by the Academic Athletic Board. This board is composed of faculty members and cadet officers of the Athletic Association. The board is responsible for advising the Superintendent in matters concerning intercollegiate athletics.

Intercollegiate athletics are an integral part of the broad educational process at the Academy. Specific objectives include:

(1) All around development of the individual.
(2) Cultivation of the qualities of leadership.

(3) An increase in sports proficiency and appreciation, with a view towards laying the basis for a life-long interest.
(4) An awareness of the problems and pressures confronting a varsity competitor.
(5) Stimulation of interests in participation and competition on all levels.
(6) Provision of a hub for development of *esprit de corps.*
(7) Provision of a variety of recreational opportunities and a social medium for the entire Corps of Cadets.

Specific intercollegiate sports engaged in are:

Football	Track
Sailing	Gymnastics
Soccer	Rifle and Pistol
Cross-country	Tennis
Basketball	Golf
Wrestling	Crew
Swimming	Baseball

Above and beyond the stated objectives is the philosophy of the Athletic Department. This philosophy proposes that athletics should be an integrated part of the total educational process of a cadet. A cadet should feel a desire to compete, but there is no "winning is everything" mandate that could be counterproductive in an environment such as the Academy. That the philosophy espoused is in actuality carried out can be easily seen by consulting the schedules for the major sports—football and basketball. Without exception, all opponents are appropriate for the size of the Academy and there is no current or anticipated "upgrading to the big time."

To further carry out a whole-man philosophy, academic standards are stringent, and a cadet must maintain a satisfactory academic standing to be allowed to participate in intercollegiate athletics.

In summary, it can be said that the Athletic programs of the USCGA offer the cadet both current and future benefits. The integration of the Athletic program into the total educational picture is an extremely forward-looking, positive approach for educating, training, and developing the whole man. It is judged that the objectives of the USCG in general, and the USCGA in particular, are well served by this program.

PROFESSIONAL STUDIES PROGRAM

The aims of the professional studies program, conducted by the Department of Professional Studies, are to educate the cadet in seamanship, law, navigation, communications, and weapons systems, and to provide him with the information and skills required for performing the duties of a junior officer. These goals are accomplished through the practical application of course-work during the summer training program. Thus, the guiding principle of this program is the education of the cadet by acquainting him with roles he is likely to assume after his graduation from the Academy and by providing him with practice in these roles in addition to the instruction he receives. The professional studies program is defined by the courses in this area specified by the core curriculum.

The cadet completes some aspect of the academic portion of this program during each academic year of residence at the Academy. During the first academic year—either in the Fall or Spring Semester—he completes Nautical Science I, an introductory course that is designed to familiarize the cadet with the USCG and its organization, missions, facilities, units, operations, and equipment.

During the second academic year, the cadet completes a two-course sequence in Navigation (Navigation I & II), which is designed to teach celestial navigation, the theory of magnetic compasses and gyrocompasses, and the theory and use of tide and current predictions, in preparation for assuming the duties of the shipboard navigator and the deck watch officer's navigational duties. In addition, the cadet learns to pilot, compute positions, compute compass error by celestial means, solve time problems, use navigational instruments, use charts and publications, use electronic navigation methods, and solve problems involving relative motion and tactical maneuvering.

During the third academic year, in either the Fall or Spring Semester, the cadet completes the Weapons course, designed to provide minimal basic knowledge of Coast Guard ordnance and gunnery, with emphasis on the duties of the gunnery officer of a high endurance cutter and the commanding officer of a small unit. The course also addresses the theoretical aspects of gunnery as this is related to current Coast Guard systems.

During the fourth academic year, the cadet completes Law I (Fall Semester) and Nautical Science III/Communications (either Fall or Spring Semester). Law I addresses the fundamental nature of law, its history and development, the principles underlying its efficient administration, and the Uniform Code of Military Justice. Nautical Science II/ Communications is designed to provide the cadet with the basic knowledge necessary for performing the duties of both deck and the various division officers and, in addition, an understanding of Coast Guard communications with respect to security, duties and responsibilities of communication officers, classified material control officers, cryptoboard members, and all holders of classified material.

In addition to the above course offerings, the Professional Studies Department provides additional instruction in military law to prepare the cadet to undertake the duties of a USCG officer in connection with preparation for and conduct of a court-martial, in the existing provisions of Domestic and International law as they pertain to maritime transportation, in civil law so that he can discharge his supervisory legal and quasi-legal duties and keep his personal affairs in good order, and in the application of the U.S. Constitution's Bill of Rights as this is currently interpreted by the Judiciary.

The practical application of the course-work that the cadet completes within the Professional Studies Department occurs during the Academy's Summer Program. At this time the cadet receives experience in maneuvering, navigation, and gunnery exercises. Finally, practical experience in advanced shiphandling is obtained during the completion of Nautical Science II aboard the Academy's fleet of small boats.

The course-work and practical experience which the cadet receives from the completion of the course offerings of the Professional Studies Department are oriented toward the development of the knowledges and skills necessary for performing the duties of Deck Watch Officer, Division Officer, Communications Officer, Shipboard Navigator, Gunnery Officer, Legal Officer, and Classified Materials Control Officer. Two of these positions (Deck Watch Officer and Division Officer) represent high-frequency initial duty positions, while the remainder represent important collateral duties. The Professional Studies program is a primary factor in the development of the cadet for the duties he is likely to perform soon after his graduation from the Academy.

CADET ADMINISTRATION DIVISION PROGRAM

The curricular objectives of the Cadet Administration Division are to provide instruction in military leadership and to develop in each cadet those professional

behaviors that are deemed necessary and essential for the successful performance of the commissioned officer role in the USCG. These objectives are accomplished through textbook-based military orientation courses, which all cadets complete during each semester of the four-year Academy program, and through the practical experience obtained during the performance of assigned military duties.

Instruction in military leadership is presented both informally and formally. Informal training in this subject is carried out through the daily practice of teamwork, unity, and cooperation. Formal instruction begins during the second academic year in Saturday morning sessions and is continued into the third year. Part of this leadership training includes a seminar in motivation. Practical experience in leadership is also obtained by cadets beginning in the second academic year when they serve as instructors for the first-year cadet military etiquette program. This practical experience is continued into the third and fourth academic years when cadets at these stages of their Academy careers serve, respectively, as instructors in the military orientation program for first-year cadets and as assistant instructors in the leadership program for second-year cadets.

The development of essential professional officer behaviors begins informally during the summer prior to the first academic year at the Academy. This instruction covers the importance of duty, discipline, and honor; Academy and Coast Guard traditions and customs; cooperation; and posture, etiquette, and appearance. Formal instruction in this area begins during Saturday morning orientation sessions, which are initiated in the first academic year at the Academy. These initial sessions are devoted to military customs, duties, and responsibilities; Coast Guard organization, history, and operations; professional skills of the seaman; and military bearing and etiquette. This instruction is also carried on outside these sessions through the operation of the Corps of Cadets, which is supervised directly by the Cadet Administration Division. Under the guidance of the Commandant of Cadets, the Brigade Commander directs discipline and the daily routine of inspections, formations, watches, military appearance, well being, and all other non-academic and non-athletic activities.

Consideration of this instruction suggests several conclusions: (a) development of leadership and officer professional behaviors largely occurs through direct practical experience, and (b) maintenance of leadership and professional behaviors largely occurs through the interaction of the upperclassmen with the lowerclassmen. While formal instruction in these areas does occur, it appears to be mainly of an informative nature. This is the traditional military academy approach to the development of leadership and professional military behavior.

SUMMER TRAINING PROGRAM

The Summer Training Program is guided by the Professional Studies Department and is coordinated with the Senior Training Officers and the Head of the Professional Studies Department. It is devoted to training cadets in the professional skills of leading men and to providing cadets with practical experience in seamanship and the various Coast Guard missions. In addition, the program is geared to help new cadets in their transition from civilian to military life. The program is implemented in four concurrent phases, which are built respectively for the first, second, third, and fourth year cadets.

Fourth Class. The first phase of the Summer Training Program is oriented towards indoctrinating new cadets (called Swabs) into the USCG and into the USCGA. This phase lasts for eight weeks and is divided into three segments: (a) Processing, (b) Academy Training, and (c) the Eagle Cruise. During Processing, cadets are sworn into the Coast

Guard and placed on the Academy roll, issued uniforms and equipment, and assigned to their quarters.

During Academy Training, cadets receive instruction in the importance of duty, discipline, and honor; in the customs and traditions of the Academy and Coast Guard; in basic seamanship, dinghy sailing, Monomay rowing, and power boat operation; in sports activities; in teamwork; in basic mathematics; and in posture, etiquette, and appearance. In addition, cadets are physically conditioned, complete an obstacle course, and are challenged to use their initiative during stress training.

Finally, during the Eagle Cruise, cadets receive practical experience in various duty positions (e.g., quartermaster, helmsman, oiler, boilerman, CIC watch stander). They are assigned watch quarter and station billets and take part in emergency drills and ship evolutions.

Third Class. The second phase of the Summer Training Program is designed to (a) provide the second-year cadet with an understanding of USCG missions and operations, (b) provide the cadet with an understanding of the enlisted man's duties so he can appreciate the scope of the knowledge required, and (c) allow the cadet to acquire shipboard skills that will add to his professional qualifications. These objectives are accomplished through the assignment of cadets to a variety of Coast Guard operational units: Long Cruise units, Great Lakes Cruise units, and District Programs Units.

Cadets assigned to the Long Cruise serve on high endurance cutters, while those assigned to District Program units serve on medium endurance cutters, buoy tenders, and similar vessels. The diversity of the units involved predicates that all cadets do not receive identical training. However, this diversity is desirable since it ensures that the second year cadets as a class will be broadly experienced.

These cadets are normally assigned to perform the duties of E3 and E4 enlisted personnel. However, duty assignments are as nearly as possible geared to the experience of the individual cadet. In order to provide the cadet with a variety of experience, his billet assignment is varied during his summer program. Finally, it is expected that cadets will perform their fair share of menial or undesirable tasks while on board training vessels.

Second Class. The third phase of the Summer Training Program is designed to develop leadership and professional skills in the third-year cadets. This phase is divided into five segments: Eagle Cruise I, Eagle Cruise II, Seamanship and Leadership Training, Marine Inspection Officer Training, and Coast Guard Aviation Training Unit.

During Eagle Cruise I, third-year cadets receive refresher training in Eagle seamanship and have an opportunity to serve as Officer of the Deck, Sailing Master, Boatswain's Mate of the Watch, and Cadet Mast Captain. Further, cadets serve as an integral part of the Eagle's crew and are allowed to function with limited outside direction as far as safety considerations permit.

During Eagle Cruise II, these cadets supervise and direct first-year cadets during their initial Eagle cruise. Third-year cadets organize first-year cadets into teams to perform specific tasks such as sailing maneuvers, bridge watches, and drill evolutions. Third-year cadets also are required to attain a certain level of navigational proficiency and display a knowledge of various professional materials during their off-watch time.

The Seamanship and Leadership segment of the third-year cadet Summer Training Program lasts for two weeks and is divided equally between instruction in Seamanship and Leadership. During the Seamanship portion, cadets receive practical experience in maneuvering Academy trawlers and small vessels under restricted operating conditions such as docking, undocking, anchoring, towing, and multiship evolutions. During the Leadership portion, third-year cadets continue to receive instruction in the leadership skills they should use in their relations with underclassmen at the Academy and with their subordinates after graduation.

The training received during the Marine Inspection Office segment is intended to give third-year cadets maximum exposure to the organizational functions and responsibilities of the USCG Merchant Marine Safety Program. The training encompasses, as far as practicable, a general overview of Marine Inspection activities, including organization, career opportunities, material inspection, licensing and certification, investigation, hearings, and shipping and discharges. Field trips with Hull and Boiler Inspectors, Investigating Officers, and Shipping Commissioners are emphasized. Most of the third-year class is assigned for training to a local Marine Inspection Office near their home. Those unable to commute to a local Marine Inspection Office are individually assigned by the Senior Training Officer.

During the final segment of the third-year Summer Training Program, cadets study Coast Guard aviation. This training is accomplished at the Aviation Center in Mobile, Alabama. They are shown the aviation capabilities, limitations, and uses of aircraft for the accomplishment of Coast Guard missions. Their instruction consists of classroom time and actual stick time in aircraft assigned to the Aviation Center. Search and Rescue (SAR) training, based on the national SAR Manual CG 608, is also taught during this segment.

First Class. The final phase of the Summer Training Program has two broad objectives: (a) to develop skills the cadet will use when he is commissioned as an Ensign, and (b) to provide an environment for leadership opportunities. Fourth-year cadets concentrate on four major areas during a Coast Guard cruise. (The time spent in each area while at sea is approximately equal and emphasizes those duties normally assigned to a Commissioned Officer, Warrant Officer, or a leading Petty Officer.) The major areas are as follows:

(1) Navigation—The cadet navigator carries out the duties of a navigator as defined in Coast Guard Regulations 8-4-3.

(2) Operation—Cadets stand watches in CIC and advise the OOD on all vessel movements and movements of other vessels in the immediate vicinity.

(3) Engineering—Cadets stand watches as Assistant to the Engineering Officer of the watch.

(4) General Division—Within this area, the fourth-year cadets become familiar with the administrative function of some primary and collateral officer assignments. Specifically, they become familiar with the duties of the First Lieutenant, Gunnery Officer, Supply Officer, Executive Officer, Ship's Exchange Officer, Wardroom Mess Treasurer, Morale Officer, Oceanographic and Meteorological Officer, the functions of the vessel's various boards and committees.

Finally, a period is set aside at the end of the cruise to allow each fourth-year cadet to pursue an indepth study of a shipboard area of his choice. He may be assigned watches as OOD, CIC Officer, or Assistant to the EWO, depending on his selection of assignments.

Summary. Consideration of the Summer Training Program and the instruction (both informal and formal) it presents to cadets at the various stages of their Academy careers suggests that this program is one of the most important aspects of the cadet's professional education and one that enables him to meet some of the major objectives of the Academy. It is through this program that cadets receive the majority of their precommissioning practical experience in performing the duties of Coast Guard Officers. Also, it is through this program that cadets receive the largest portion of their sea experience. The extent to which this program is successfully completed should have a significant bearing on the cadet's initial performance in his first post-Academy assignment.

Section 5

MEETING EDUCATIONAL AND TRAINING REQUIREMENTS

This section describes the combined training and educational requirements for the USCGA. As such, it brings together those requirements necessarily imposed upon the educational and training curricula in order to insure (a) accreditation of the USCGA by the New England Association of Schools and Colleges, Incorporated (NEASCI), and by accreditation of the Engineering curricula by the Engineering Council for Professional Development (ECPD), (b) acceptance of Academy graduates by post graduate schools, and (c) accommodation to the requirements for filling billets in the USCG. This section also summarizes the job-task inventory questionnaire data. For the purpose of this report, these descriptions will form the totality of educational and training requirements.

Specifically, the topics to be addressed are accreditation, preparation for professional occupations, preparation for postgraduate study, preparation for job entry, and preparation for junior officer leadership. The objectives have been to review topics by describing the data bases, and to develop specific educational and training requirements in terms of definitions of the levels of knowledge or proficiency required. The definitions are as follows:

General Knowledge (G) is an awareness of the introductory and fundamental facts, concepts, and principles that are basic to understanding the general implications and applications of a subject in a specific area.

In the Academy curriculum, this level of instruction is met by having the particular subject matter discussed in a course of instruction that includes other subject matter.

Working Knowledge (W) includes sufficient knowledge and skills pertaining to the fundamentals of a subject and to the techniques of its employment to permit routine application by the student under job conditions with the guidance, training, and assistance that are normal in his duty assignment.

In the Academy curriculum, this level of instruction is met by a specific course of instruction (course title) in this area.

Qualified (Q) The level of knowledge or proficiency in which the student has the comprehensive knowledge and skills in a broad subject area to permit skilled functioning in a specific job and, where appropriate, has also developed the ability to supervise others in that job.

In the Academy curriculum, this level of instruction is met by a specific option program.

The three preceding definitions have been referenced to the Academy. However, other environments are available for education or training. The following definitions identify two of these areas:

On-the-Job-Training is practical, often informal, instruction received in a specific job environment. Much of this instruction involves the teaching of skills and procedures rather than basic knowledge.

Postgraduate School involves formal education or training received after graduation from the Academy in a recognized and established program of instruction.

The question of whether the Academy can meet the requirements for education and training is answered in general terms. Specific recommendations are given in Section 2.

ACCREDITATION BY NEASCI

Accreditation of an institution by its regional educational council is an important factor to any degree-granting college. Accreditation is an endorsement of the institution by an outside agency and, thus, by implication, of the quality of education obtainable. Accreditation is one key used by graduates to gain admittance to postgraduate education. A survey conducted by HumRRO of 52 colleges indicated that *without exception* graduate schools would not consider an applicant who was not a graduate of an accredited institution.

The USCGA is located in the New England area, where accreditation is governed by the New England Association of Schools and Colleges, Incorporated, Burlington, Massachusetts (NEASCI). The New England Association is a voluntary, self-governing organization of educational institutions. Its purpose is to develop and maintain sound education standards. Admission to, and renewal of, membership in the Association denotes formal accreditation.

Membership as an institution of higher education is open only to post-secondary, degree-granting institutions that offer at least two years of academic work at the college level. An institution is elected to membership by vote of the delegates of member institutions at an annual meeting. An institution is initially nominated by the Executive Committee after it has reported the findings of a self-study and after a visiting subcommittee has examined the institution and reported to the Commission of Institutions of Higher Education, which in turn has made a recommendation to the Executive Committee.

Requirements. The standards of evaluation (Table 5) are essentially *qualitative* and are applied to an institution as a whole. The areas of major concern in the evaluation of an institution are (a) organization and control, (b) program, (c) faculty, (d) students, and (e) facilities and resources.

Implications. The essentially qualitative nature of the standards for membership in the New England Association suggest that these standards reflect guidance, rather than direction. One requirement is definite: "terminal programs and curricula in technical, specialized or professional fields are expected to show an appropriate regard for the three major areas of knowledge, i.e., the humanities, the natural sciences, and the social sciences, by ordinarily devoting at least a quarter of the curriculum to general education courses from among these three areas" (NEASCI, 1970). The application of the standards is to the institution as a whole and the interpretation of standards is made within the framework of the institution's stated objectives. These standards are not restrictive, and pose no problem in curriculum planning.

Concomitantly, the recommendations offered by HumRRO do not violate either the spirit or the letter of the standards and requirements set forth by the New England Association.

The USCGA is able to meet the requirements imposed by maintaining membership in, and accreditation by, NEASCI.

Table 5

NEASCI Standards of Evaluation

Area	Quantitative Standard	Qualitative Standard
Organization and Control	None	The governing board should have general control over the institution, should assure the support necessary for effective functioning, should have a competent administrative staff, and should use the faculty to develop and conduct the educational program. Student views should be heard. Nonprofit character of the job should be demonstrated.
Program	25% of the curriculum should be devoted to the humanities, the social sciences, and the natural sciences.	Subjects should be presented at an advanced level. Requirements for various programs and degrees should be clearly stated. Evidence must be present that students can transfer easily to other institutions and that graduates can go on to advanced degrees.
Faculty	None	Substantial number of the faculty should hold full-time teaching positions. Qualifications should be appropriate for assignments. Professional growth should be encouraged.
Students	None	The institution should have an orderly and ethical program of admission, and should have equitable and clearly announced practices regarding student rights and related matters.
Facilities and Resources	None	Quality of the library is important. Classrooms and laboratories should be appropriate size. Residence accommodations, food service, health service, athletic and other facilities should be of good quality. The institution should be financially stable.

ACCREDITATION BY ECPD

Historically, the USCGA has focused its instruction in the area of engineering and, in doing so, has paralleled the traditional approach used by the U.S. Military Academy and the U.S. Naval Academy. (The importance of engineering as a major discipline was established early.) The option program now implemented at the Academy allows cadets to choose an area of major interest from a list of 13 options, six of which are engineering. Because of the traditional emphasis on engineering, and because of the six engineering options, description of the requirements imposed upon the engineering curricula (in order to receive accreditation, if that is desired) is of interest.

The agency responsible for the accreditation of the engineering curriculum is the Engineers' Council for Professional Development (ECPD), 345 East 47th Street, New York, New York. ECPD is recognized by the National Commission of Accreditation as

the *sole* agency responsible for accreditation of educational programs leading to degrees in engineering.

Research into accreditation by ECPD, conducted by the American Council on Education, shows that 216 colleges and universities have at least one ECPD-approved engineering curriculum. These include the U.S. Air Force Academy and the U.S. Naval Academy.

The ECPD accomplishes its purpose through 10 standing committees, one of which is the Engineering Education and Accreditation Committee. The wide acceptance of the committee's list by organizations such as the National Bureau of Engineering Registration and the National Council of Engineering Examiners, by nearly all of the individual state boards, by the professional engineering societies, by various Federal agencies, and by the institutions themselves is evidence of the significance of ECPD accreditation.

A basic policy of the Committee is to accredit specific educational programs (e.g., Electrical Engineering) *rather than institutions.* Before a program can be accredited by the ECPD, the institution must have been accredited by its regional accrediting agency.

An institution's program is evaluated on the basis of data submitted by the institution plus a written report from an on-site visiting party. In order to be considered for accreditation, an engineering program must be designed to prepare for the practice of engineering at either the basic or the advanced professional level. (Five of the six engineering curricula offered by the USCGA are eligible for accreditation at the Basic Level by ECPD.)

Requirements - Basic Level. ECPD requires that an institution offer the equivalent of approximately two and one-half years of study in the area of mathematics, science, and engineering. The course-work should include at least one-half year of mathematics beyond trigonometry, one-half year of science, one year of engineering science, and one-half year of design, synthesis, and systems. Also, ECPD requires the equivalent of at least one-half year (minimum) in the area of the humanities and social science.

Requirements - General Criteria. Qualitative criteria for judging the engineering program are also given on the size and competence of the faculty, the admission, retention, and scholastic work of students, the attitude of the administration towards teaching, research, and scholarly production, and the facilities of the engineering department as compared to the facilities of other departments. These criteria are qualitative and general in nature in that they require "good" or "adequate" facilities, and tend to duplicate the criteria of the regional accreditation association.

Implications. The specific requirements for accreditation at the Basic Level indicate that careful consideration must be given to curriculum modification when accreditation is desired. The primary consideration is the large amount of time that is required to implement the ECPD criteria. For the Basic Level, two and one-half years are specified as engineering content and there is an additional requirement for a minimum of one-half year of humanities and social sciences. In addition to these course requirements, there are the requisite courses (e.g., English Composition) to be considered.

The Academy can be considered a five-year program of instruction (four academic years and the four 3-month summer programs); ECPD requirements can be accommodated. However, if these requirements are implemented, there is a resultant need to be extremely careful in the allocation of time. Time is scarce for electives and other needed or desirable subjects. Also, ECPD accreditation may impose increased costs, such as more elaborate facilities and/or professional personnel, upon the Academy.

The recommendations offered by HumRRO avoid conflicting with the need for ECPD accreditation, should ECPD accreditation be awarded.

The USCGA is able to meet the requirements imposed by application for accreditation by ECPD.

PREPARATION FOR POSTGRADUATE STUDY: ACCEPTANCE

Postgraduate training for graduates of the Academy is of paramount importance. The recent Rice Study, made by the USCG, has placed clear emphasis on the need for increased postgraduate training. The Rice Study was performed to develop the quantitative and qualitative service requirements for Coast Guard officers over the succeeding ten-year period.

In the conclusions identifying several areas that can possibly affect the curricular system of the USCGA, one relates directly to the need for postgraduate training. The study cites a 100% increase in the requirements for special training (post-Academy training and education for Academy graduates) in the ENS, LTJG, LT, and LCDR grades and a 50% increase in the number of these requirements for the CDR and CAPT grades.

Acceptance into, and success in, postgraduate education programs by Academy graduates impose several requirements upon the Academy. First, as reported above, the Academy must continue to be accredited by NEASCI. Second, the Academy must continue to provide as many opportunities for educational excellence as possible.

This second requirement involves meeting, at a bare minimum, two demands: (a) The Academy cadet must be given an opportunity to reach and maintain a standard of academic excellence that compares favorably with the standards at the major universities in the nation, and (b) the cadet must be given an opportunity to acquire competencies in areas of study that are at least comparable to the competencies held by the students he must compete with upon entering postgraduate educational programs.

In an effort to better understand the requirements imposed upon the Academy by the need to prepare students for postgraduate education, two surveys have been conducted. One is a survey of those schools, colleges, and universities currently accepting USCGA graduates. The other is a survey of Coast Guard officers (Academy graduates) currently attending postgraduate educational programs.

Survey of Postgraduate Institutions. A review of the academic requirements for 22 different schools, colleges, and universities is contained in the "postgraduate education" section of *The Academy and the Coast Guard*, 1 December 1971. In this booklet, LCDR Wayne Stevens, former Assistant to the Dean, brought together the specific entrance requirements for Coast Guard-related programs. In 1973, a list of graduate-level institutions that had accepted Coast Guard Academy graduates included eleven additional schools, colleges, and universities. Table 6 lists the total of 33 institutions and the related programs of study.

The goal of the survey of postgraduate education was to go beyond describing the formal requirements by beginning a survey of the informal but real requirements for entrance into postgraduate training. In order to identify these informal requirements, a letter was sent to the Dean of the Graduate School of each institution requesting that both the formal entrance requirements (e.g., what is printed in the official catalog) and the informal entrance requirements (e.g., factors that are used because of the intense competition among applicants for postgraduate education) be described. A summary of the results of this request is presented in Table 7.

Requirements. A comparison of the formal and informal requirements identified three areas worthy of comment. First, the informal requirements often significantly exceed the formal requirements set forth in the catalog. Thus, an applicant who has only minimal preparation may make an unrealistic assessment of his chances to be admitted to a particular school. Second, the informal factors may change from year to year and, to the extent that they do, competitive preparation becomes increasingly difficult to identify and anticipate. Third, in the future only the most able prospective students may be accepted into the various graduate programs.

Table 6

Graduate Level Institutions and Their Respective Related Programs of Study

Institution	Program of Study
Listed 1 Dec 1971[a]	
Rensselaer Polytechnic Institute	Mathematics Management and Industrial Engineering
Wesleyan University	Humanities Science
U.S. Naval Postgraduate School	Management (Economics) Aviation Electronics Engineering Communications Management Computer Systems Management Electronics Engineering Management Naval Engineering Oceanography Operations Research/Systems Analysis
U.S. Air Force Institute of Technology	Aerospace Mechanical Engineering Aviation Electronics Engineering
Purdue University	Aviation Engineering Administration
University of Maryland	Chemical Engineering
University of Illinois	Civil Engineering
Massachusetts Institute of Technology	Electronics Engineering Naval Engineering
George Washington University	Financial Management Law Public Administration
University of Michigan	Naval Engineering
University of Rhode Island	Ocean Engineering
University of Washington	Oceanography
American University	Public Administration
University of Pittsburgh	Public Administration
Air War College	
Industrial College of the Armed Forces	
National War College	
Naval War College (Warfare)	
Naval War College (Command and Staff)	
Merchant Marine Industry Training	
Armed Forces Staff College	

(Continued)

Table 6 *(Continued)*

Graduate Level Institutions and Their Respective Related Programs of Study

Institution	Program of Study
Added by 1973	
RCA Institute	Advanced Electronics Technology
University of Connecticut	Science PhD Program in Supervision and Curriculum in Higher Education
U.S. Naval Hospital	Hospital Administration
Pennsylvania State University	Electrical Engineering
Catholic University	Law
College of William and Mary	Law
Georgetown University	Law
Vanderbilt University	Law
Syracuse University	Law
Florida State University	Public Administration Oceanography
University of Miami	Mathematics Law

[a] See the Postgraduate Education section of the booklet, "The Academy and the Coast Guard", 1 December 1971.

Table 7

Formal and Informal Requirements of Surveyed Graduate Schools

Institution	Formal Requirements	Informal Requirements
Florida State University	1. 3.0 GPA[a] 2. 100 GRE[b] 3. 1 year of chemistry, calculus, and physics. 4. Undergraduate degree with major or minor in science, mathematics, or engineering. 5. 3 letters of recommendation required for assistantship.	1. Good letters of recommendation. 2. If scholastic record is modest, it must show improvement as student moves toward graduation. 3. Primary selection admits only 25 students. Alternate selection list has 10 more names.

(Continued)

Table 7 *(Continued)*

Formal and Informal Requirements of Surveyed Graduate Schools

Institution	Formal Requirements	Informal Requirements
University of Miami	1. Baccalaureate degree. 2. Minimum 450 LSAT[c] score. 3. Minimum 2.3 (out of 4.0) GPA.	1. The LSAT score, the 4 years GPA and the last 2 years GPA are included in a formula to identify top students. This year (as an example) the 4 year GPA needed to be 3.2, the 2 year GPA needed to be 3.35, and the LSAT needed to be over 600. 2. This year (as an example) minimal requirements were cumulative GPA 3.2, 2 year GPA 3.35 and LSAT over 600.
Pennsylvania State University	1. Baccalaureate degree. 2. Minimum 2.5 GPA - final 2 years. 3. Must have undergraduate courses appropriate for graduate major.	1. Exceptions to the minimum 2.5 GPA may be made for students with special background, abilities, or interests.
University of Connecticut	1. GPA of 2.6. 2. 2 letters of recommendation. 3. Miller Analogies Test Score. 4. STEP[d] Writing Test Score. 5. GRE Aptitude [for PhD. candidates].	1. Minimum GPA may rise due to competition. 2. The extent of the applicant's experience in his profession is considered. 3. Demonstrated writing ability. 4. Availability of faculty and staff for supervision.
College of William and Mary	1. Baccalaureate degree from accredited institution. 2. 2 letters of recommendation. 3. LSAT score.	1. LSAT averaged 616 for 71-72 class. 2. GPA averaged 3.0 for 72-73 class. 3. 2,244 applications were received and 150 were admitted.
RCA Institute	1. High school graduate GED[e] 2. 2 years of algebra. 3. 1 year of geometry. 4. 1 year of physics.	1. One year trigonometry is very helpful.
Vanderbilt University	1. Baccalaureate degree from accredited institution. 2. Transcript of grades. 3. 3 letters of recommendation. 4. LSAT score.	1. Usually a minimum GPS of 3.0. 2. Usually a minimum LSAT score of 550-600. 3. Highly individualized admissions policy (A committee makes judgements based on the apparent strengths and weaknesses of each applicant).
Syracuse University	1. Three letters of recommendation. 2. Two copies of official transcripts. 3. GRE (Advanced and Aptitude) scores.	1. [None given]

(Continued)

Table 7 *(Continued)*

Formal and Informal Requirements of Surveyed Graduate Schools

Institution	Formal Requirements	Informal Requirements
Georgetown University	1. BA degree from accredited institution. 2. LSAT score. 3. Completion of formal application and required supporting documents.	1. Has no prescribed major and no cut off points. However, applicants should know that the area of competition is usually the credentials of the preceeding class. Currently, that would be a GPA of 3.4 and a LSAT of 650.
Catholic University	1. Two letters of recommendation. 2. LSAT score. 3. Completion of formal application and required supporting documents.	1. For first-year students the GPA averages 3.30 and the LSAT averages 630. 2. During the current academic year, only 200 students were accepted out of 2500 applications.
U.S. Naval School of Health Care and Administration	1. Must be a U.S. or Allied Commissioned officer.	1. Officers assigned should be mature, and have demonstrated ability and leadership qualities. 2. Experience in health care administration is desirable.

[a]GPA - Grade Point Average
[b]GRE - Graduate Record Examination
[c]LSAT - Law School Admissions Test
[d]STEP - Sequential Test of Educational Progress
[e]GED - General Educational Development Certificate

The last point can be clarified by reviewing the median reported minimum four-year grade point average (GPA) for admission into the Coast Guard-approved institutions. This median is 3.0 (B average). Data describing the 1972 graduating class at the USCGA indicate that 25% had a four-year GPA of 3.0 or better (Figure 2). To some extent, the problem of the GPA can be attenuated by producing graduates with high Graduate Record Examination (GRE) scores. This, in turn, requires able students and quality education. Another, more practicable solution is to have a graduate's credentials carried from school to school until an acceptance is obtained. This practice is currently being used by the USCG.

Implications. The survey of institutions providing postgraduate study clearly identifies current administrative and academic requirements and, moreover, points out a pervasive discrepancy between formal and informal-but-real requirements. It also brings to light a very serious problem: To be competitive for admission an applicant must stand near the top of his class. By definition that excludes most of any graduating class. This problem will have to be faced by those planners concerned with obtaining postgraduate training and education for Coast Guard officers.

Distribution of the 1972 Graduating Class Four-Year Grade Point Averages

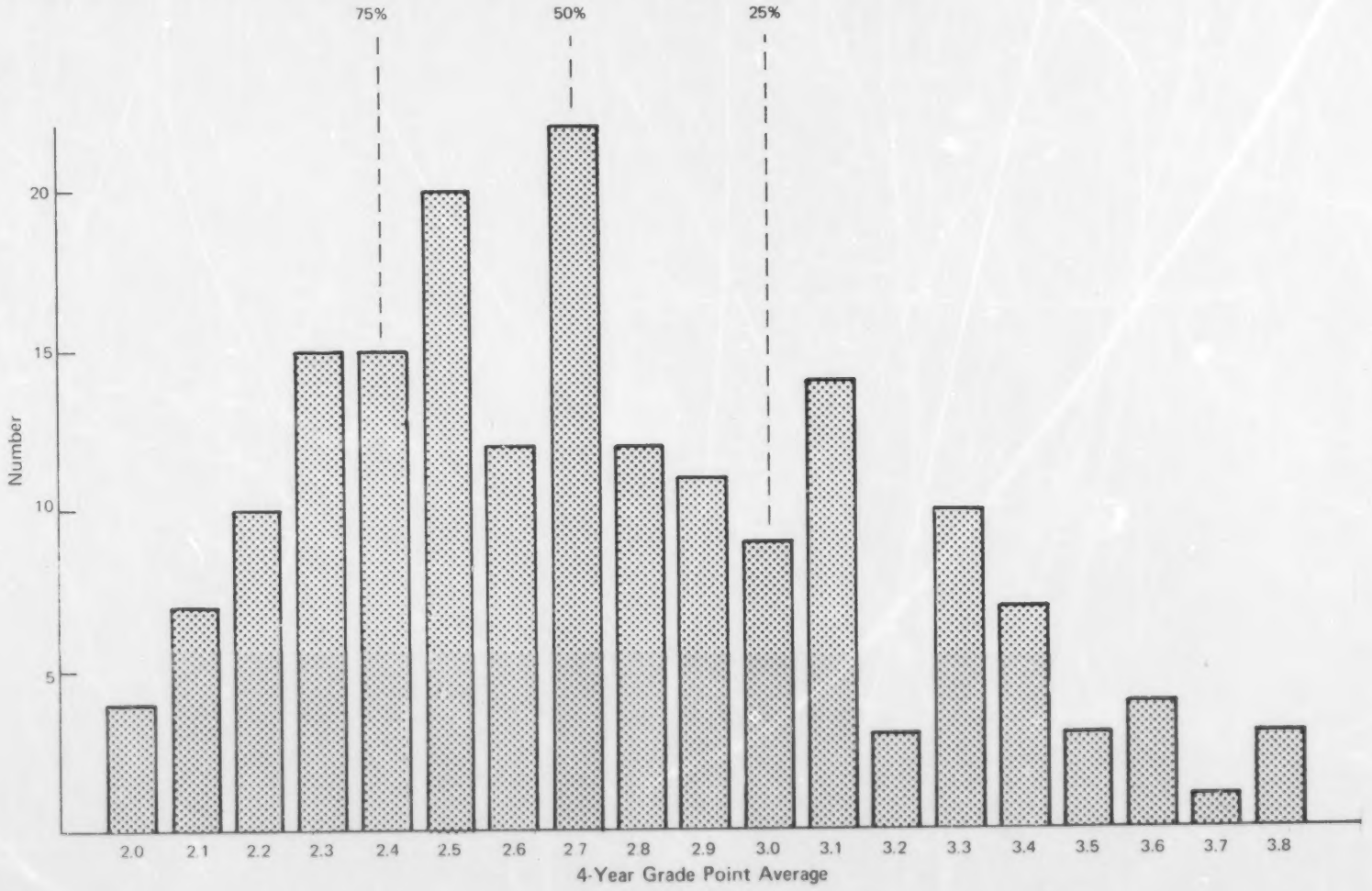


Figure 2

The USCGA currently is meeting the following requirements:

General Requirements	Currently Supplied by the Academy
(1) Must hold Bachelor's Degree.	(1) All graduates hold the degree of Bachelor of Science.
(2) Must be a graduate of accredited institution.	(2) USCGA is accredited by NEASCI.
(3) Must have required class standing based on a grade-point system.	(3) Classes are ranked according to a grade-point system.
(4) Scores on specific tests must be supplied.	(4) All standardized tests are available.

However, this is an area that needs to be brought sharply into focus. Objectives, procedures, and results need to be examined with an eye to setting up efficient and effective machinery for procuring postgraduate training and education for Academy graduates. This process is dynamic and should be periodically reviewed.

PREPARATION FOR POSTGRADUATE STUDY: COURSES

As stated above, two surveys were conducted in an effort to better understand the requirements imposed upon the Academy by the need to prepare Academy graduates for postgraduate education. The survey of institutions provided information that is of great importance to postgraduate educational planners, but that is not directly relevant to the central topic of this report: USCGA curricula.

The survey of postgraduate students was targeted at specifically identifying course requirements that could be directly related to the curriculum at the USCGA. The survey of students was directed at officers who were enrolled in postgraduate programs in 1972-1973. The research was conducted in two steps. First, interviews were conducted with 16 Coast Guard officers enrolled in various postgraduate programs at the U.S. Naval Postgraduate School at Monterey, California. The information obtained in these interviews was used to develop a questionnaire. Second, the questionnaire was mailed to Coast Guard officers currently attending postgraduate classes. The questionnaire specified that it was to be filled out only by those officers who were USCGA graduates. Of the 114 questionnaires mailed out, 87 were returned. The distribution of these officers by graduating class is shown below:

1941 - 1
1953 - 1
1956 - 1
1957 - 2
1960 - 2
1961 - 3
1962 - 1
1963 - 2
1964 - 3
1965 - 4
1966 - 8
1967 - 11
1968 - 24
1969 - 20
1970 - 4

The responses from those officers who had graduated in 1968 or later were separated from those officers graduating in 1967 or earlier. This separation reflected acknowledgment of the substantial curriculum changes (the development of the option plan for cadets) that took place at the Academy during the late 1960s. Data are available for the entire sample surveyed; however, this report will focus on the group of 48 officers graduating in 1968, 1969, and 1970.

The questionnaire used in the survey targeted at three categories of data. First, respondents were asked "In terms of your current postgraduate study, please identify the three most valuable courses that you took at the Academy." Second, respondents were asked "Can you identify three specific courses that would have been valuable to you in pursuing your postgraduate education had they been offered at the Academy?" Third, respondents were asked to judge the degree to which they were adequately prepared at the Academy for postgraduate education.

Survey Information. Table 8 lists the *most valuable courses*, collapsed across the three choices. Table 9 lists the courses that *would have been valuable* collapsed across three choices.

Table 8

"Most Valuable" Courses

(1968-1970 Graduates)

Course Title	Times Mentioned	Course Title	Times Mentioned
Mechanics	12	Classical Western Thought	1
Differential Equations	11	Matrix Algebra	1
Calculus	10	Thermodynamics	1
Electrical Engineering	8	Money/Banking	1
Statistics	8	Linear Algebra	1
Engineering Mathematics	7	Military Policy	1
Fluid Mechanics	7	European Literature	1
Strength of Material	6	Statics & Dynamics	1
Electronics	6	Operations Research	1
Naval Architecture	5	Systems Analysis	1
English	4	Oceanography	1
Physics	4	Accounting	1
Legal Affairs	4	Probability	1
Economics	3	Complex Variables	1
Law	3	Communications Systems	1
Engineering Design and Analysis	3	Automatic Control Theory	1
Management	2	Comparative Government	1
Chemistry	2	Psychology	1
Electrical Circuits	2	Power Engineering	1
Numerical Analysis	2	American Literature	1
Computer Science	2	Feedback Control Systems	1
Government	2	Stresses and Strains	1
Structural Analysis	1		
International Relations	1		

Table 9

"Would Have Been Valuable" Courses

(1968-1970 Graduates)

Course Title[a]	Times Mentioned	Course Title[a]	Times Mentioned
*Structural Analysis	13	*Numerical Analysis	1
*Computer Science	11	*Complex Variables	1
*Linear Algebra	7	Advanced Economics	1
Advanced Law Courses	6	In-Depth Reading	1
*Engineering Materials	4	*Constitutional History	1
*Chemistry	4	Technical Writing	1
*Human Behavior	3	*Sociology	1
*Philosophy	3	*Soil Mechanics	1
Mechanical Dynamics	3	Public Administration	1
*Advanced Calculus	3	Controls	1
*Differential Equations	3	Basic Research	1
World History	2	*Probability Course	1
Advanced Fluids	2	*Optics	1
*Advanced Mathematics	2	Logic	1
Speed Reading Course	2	*Ocean Engineering	1
Creative Writing	2	*Fourier Transforms	1
*Ship Systems	2	*Marine Propulsions	1
Accounting	2	Art and Music Appreciation	1
Non-linear Circuits	1	Hydrology	1
Electromagnetic Fields	1	*Network Theory	1
*Matrix Algebra	1	*Heat Transfer	1
Bible/Renaissance Thought	1	*Random Processes	1
Digital Electronics	1	*Mechanical Design	1
*System Dynamics	1	*Systems Dynamics	1
Social Psychology	1	*Marine Engineering	1
Managerial Finance	1	*Math Modeling	1
*Quantum Mechanics	1	*Advanced Physics	1
Systems Analysis	1		
Public Speaking	1		
Legal History	1		
*Marine Hydro-Dynamics	1		
Contracts and Specifications	1		

[a] * indicates that the course is currently being offered at USCGA.

The five alternatives given for the question concerning the adequacy of preparation at the Academy were:

1 - I feel that I was completely *unprepared* for postgraduate school.
2 - I feel that I had some preparation but it was less than adequate.
3 - I feel that I was *adequately* prepared.
4 - I feel that I was *more than adequately* prepared.
5 - I feel that I was fully prepared for postgraduate school.

For the focal group, the mean response was 3.04 (standard deviation was .85) or non-numerically, "I feel that I was adequately prepared." Officers in postgraduate education programs generally feel that they were adequately prepared at the Academy.

The vast majority of *most valuable* and *would have been valuable* courses are quantitative in nature.

More than half of the courses listed as *would have been valuable* courses, if available, are currently being offered at the USCGA. That is, preparation is available in most of the areas in which former cadets have felt deficiencies. The course titles (Table 9) marked with an asterisk are courses that are currently being offered at the Academy. (In passing, it must be noted that it is not the recommendation of this report that the remainder of *would have been valuable* courses be added to the Academy curriculum. The data points are too few to justify such a recommendation. However, this survey could serve as a model for a yearly data collection effort that could, over time, amass a data base that would justify specific additions to the curricula.)

Implications: Utilizing the graduate schools and subject matter areas in which Academy graduates are currently enrolled, the following appear to be mandatory subjects: (In this and following listings, the symbol G denotes General Knowledge, W-Working Knowledge, and Q-Qualified.)

Subjects	Job Requirements[a]	USCGA[b]
Mathematics (Basic)	W	W
Algebra	G	G
Calculus	G	G
Trigonometry	G	G
Geometry	G	G
Mathematics (Advanced)	Q	Q
Differential Equations	W	W
Linear Algebra	W	W
Advanced Calculus	W	W
Complex Variables	W	W
Probability	W	W
Engineering	Q	Q
General Engineering	Q	Q
Engineering Mathematics	W	W
Mechanics	W	W
Strength of Materials	W	W
Marine Engineering	Q	Q
Electrical Engineering	Q	Q
Circuits and Signals	W	W
Electrical Engineering	W	W
Electronics	W	W

[a] Level of knowledge or proficiency required by job.

[b] Level of knowledge or proficiency currently met by Academy curricula.

W - Working knowledge; G - General knowledge; Q - Qualified.

The USCGA is able to meet the requirements for offering courses judged to be necessary for competitive postgraduate study.

PREPARATION FOR PROFESSIONAL OCCUPATIONS

The diverse functions served by the USCG require that it maintain a reservoir of officers who are qualified by training and education to serve a variety of advanced technical and senior managerial assignments. In the last 25 years, the USCG mission emphasis has been on preventive programs. In the future a growing portion of the Coast Guard's increasing resources will be devoted to existing and new preventive programs. For such programs to be successful they must be implemented by personnel with sound knowledge and understanding of the program requirements; that is, such personnel should have substantial expertise in the program area, expertise gained through the completion of academic education or formal training in professional areas related to the program area.

Rice Study and Long Range View. The study to determine the future commissioned officer requirements in the USCG (the Rice Study) was performed to develop the quantitative and qualitative service requirements for USCG officers over the succeeding 10-year period. The data for the study were obtained from program managers at the USCG Headquarters, from senior and junior officers in the field, and from representatives from the Federal Aviation Administration, Sikorsky Aircraft, and Harbridge House. The data consisted of information obtained from interviews and questionnaires designed to address future officer requirements.

The conclusions of the Rice Study identify several areas that can possibly affect the curricula system of the Academy. One relates directly to the need for increased professionalism—demonstrable competence, at a professional level, in specialties that find incumbents both inside and outside the USCG. The Rice Study established that there will be a continued need for Coast Guard officers to receive specialized training in Engineering, the Natural Sciences, and the Social Sciences. The study cites a growing need for commissioned officers with management training, particularly in the senior officer grades, and an emerging requirement for specialized training in marine transportation, environmental protection, port management and economics, enforcement of laws and treaties, and systems safety and reliability engineering. The Rice Study reflects both current and anticipated mission requirements of the Coast Guard. It reflects the specificity and quantitative nature of the mission requirements that will be imposed upon Coast Guard officers in the accomplishment of their duties.

The Long Range View has also clearly emphasized the need for increased professionalism in the Coast Guard. The Long Range View document was produced to provide planners with a common foundation for the development and elaboration of the future needs of the service.

Requirements. Inspection of the Rice Study and the Long Range View identified 20 professionally oriented areas that will need to be staffed with competent Coast Guard officer personnel. These include marine transportation, port safety and management, prevention of/intervention in marine pollution problems, marine and lands sanitation, aquaculture, mineral extraction from the sea floor, communication, collection of oceanographic data, application of quantitative techniques to management and cost problems, computer science and technology, law enforcement, ocean engineering, chemical engineering, naval engineering, nuclear engineering, systems analysis, shipboard engineering, meteorology, and civil engineering. These professional areas were identified by examining the Coast Guard program projections for the next 10 years, study of the summary of program managers and field officers' observations in the Rice Study, and study of the policies and projections developed in the Long Range View. Filling billets in these professional areas with professionally competent personnel can come about only through training and education in academic areas related to these professional fields.

Survey for Curricula. From the survey, it was not possible to identify a specific program of instruction taught anywhere concerning Port Safety and Management, Aquaculture, and Mineral Extraction from the Sea Floor. These activities represent specific applications of broad subject matter areas, for example, marine transportation, the cultivation of plants (agriculture), and mining. General backgrounds in agriculture and mining will prepare the student for involvement in marine application. Survey courses in these areas would emphasize specific applications to the marine environment.

Port Safety and Management is part of the general area of Transportation and is concerned with the management of transport and traffic. Port Safety and Management would be part of a *set* of course offerings in Transportation.

From the survey, curricula in Transportation, Environmental Protection, Communication, Law Enforcement, and Systems Analysis were identified. At the undergraduate level, course offerings specific to each area were offered after a core curriculum was completed (i.e., after the first two years of the students' undergraduate career). The remaining time (the junior and senior years) was devoted to courses in the specific area and to free or restricted electives. The results of the survey of the curricula in these areas suggest the following course titles as appropriate for each area:

Transportation

Typical courses are:

- Product/Operation Management
- Finance in Business Enterprises
- Basic Marketing
- Elements of Business Statistics
- Organizational Behavior
- Integrated Report Writing
- Principles of Transportation
- Competition of Ideas in a Business Society
- Business Policy
- Problems in Transportation
- Transportation Research Methods
- International Trade & Finance
- Location, Transportation, and Regional Analysis
- Transportation Geography
- Marine Transportation
- Transportation Engineering
- Port Management
- Port Safety

Environmental Protection

Typical courses in these programs at the undergraduate level are:

- Environmental Quality and Man
- Treatment of Waste Water
- Industrial Waste Treatment
- Introduction to Environmental Resource Systems
- Environmental Biology
- Environmental Control
- Water and Waste Water Analysis
- Chemistry of Water Treatment

Courses that may be given at the graduate level are:

- Advanced Water Treatment Operation
- Advanced Environmental Engineering Design (I & II)
- Water Quality Management
- Environmental Resource Systems
- Urban Environmental Problems
- Estuarine Systems
- Pollution Transport Problems
- Aquatic Microbiology
- Biology of Aquatic Systems
- Environmental Chemistry
- Advanced Water Analysis
- Principles of Water Chemistry
- Radiation Protection Engineering
- Electronic Product Pollution
- Basic Problems in Occupational Health & Industrial Environments
- Atmospheric Pollution
- Environmental Instrumentation
- Air Pollution Sampling and Analysis
- Environmental Meteorology
- Environmental Micrometeorology
- Ecological and General Systems
- Solid Wastes
- Analysis of Solid Wastes
- Design of Solid Waste Management Systems

Law Enforcement

Typical courses are:

- Introduction to Law Enforcement
- Patrol Administration
- Criminal Procedures and Evidence
- Criminal Investigation
- Introduction to Industrial and Retail Security
- Law Enforcement Organization and Administration
- Introduction to Criminology and Penology
- Introduction to Public Administration
- Introduction to Maps and Air Photos
- Drug Use and Abuse
- Constitutional Law - American Federal Systems & Rights and Immunities
- Organized Crime
- Community Relations
- Courts and Criminal Procedure

Systems Analysis

Typical courses are:

- Engineering Statistics
- Electric Circuit Theory
- Digital Circuits
- Engineering Thermodynamics
- Electronics

Introduction to Systems Analysis
Systems Transfer Analysis
Engineering Analysis
Stochastic Processes
Feedback Systems Analysis
Design of Experiments
Systems Analysis Methodology
Human Factors Engineering
Systems Analysis Applied
Computer Simulation Systems

Communications

Typical courses are:

Communications Electronics
Electronic Instruments and Measurements
Communication Theory
Communications Engineering
Microwave Systems
Radar Engineering
Sensors

Implications. The Rice Study and the Long Range View indicate that there will be a need for more officers who have individual professional expertise in engineering, natural science, and social science areas in the immediate future. Such expertise gives the Coast Guard the capability for developing and implementing preventive programs targeted at meeting current and future mission requirements relating to marine transportation, port management, pollution, seabed resources, scientific research in the sea and around coastal areas, non-defense communication, and finance/management. The following requirements appear to be reasonable projections:

Subjects	Job Requirements[a]	USCGA[b]
Engineering	Q	Q
Ocean Engineering	Q	Q
Nuclear Engineering	Q	Q
Shipboard Engineering	Q	Q
Civil Engineering	Q	Q
Naval Engineering	Q	Q
Chemical Engineering	Q	G
Social Sciences		
Management	Q	Q
Economics	Q	Q
Computer Science	Q	Q
Marine Law Enforcement	W	G
Transportation	W	G
Systems Analysis	W	G

Subjects	Job Requirements[a]	USCGA[b]
Natural Sciences		
Oceanography	Q	Q
Marine Transportation	W	G
Port Safety	W	G
Marine/Land Sanitation	W	G
Environmental Protection (Marine Pollution)	W	G
Aquaculture	W	G
Communications	W	G
Meteorology	W	W

[a] Level of knowledge or proficiency required by job.
[b] Level of knowledge or proficiency currently met by Academy curricula.

The USCGA is not currently meeting the requirements imposed by increasing the number of members within traditional professions, and by increasing the number of professions represented within the USCG. Whether meeting these requirements is an appropriate mission for the Academy is a different question. Some of this preparation will have to be relegated to postgraduate education and training outside the Academy.

PREPARATION FOR JOB ENTRY

The processes specified to be used in this project were two: (a) The job-task questionnaire was to be developed in a format compatible with job-task analysis procedures developed by the Air Force (including compatibility with data analyses using CODAP 360), and (b) the educational and training objectives were to be developed using a systems engineering approach, in accordance with the developmental steps outlined in Army CONARC Reg 350-100-1.

The questionnaire was developed by using the USCG billet survey as the basis for identifying the jobs and by using standard job analytic procedures for identifying the tasks.

The Coast Guard distributed the questionnaire. It was administered to a sample of 548 USCGA graduates. These officers held a wide variety of billets at many different operating facilities (OPFACS) (Table 10). There were 102 ENS (19%), 254 LTJG (46%), 165 LT (30%), and 27 LCDR (5%).

Table 10

Number of Academy Graduates at Each OPFAC

Type	Number
High Endurance Cutter	103
Medium Endurance Cutter	38
Patrol Boats	20
Icebreakers	26

(Continued)

Table 10 *(Continued)*

Number of Academy Graduates at Each OPFAC

Type	Number
Buoy Tenders - Seagoing	27
Buoy Tenders - Coastal	9
Training Cutters	3
Air Stations and Detachments	43
Stations	3
SAR Facility	1
Bases (except Base New York)	11
Yard	2
Marine Inspection Office	23
Port Safety Stations	3
Group Offices	6
LORAN Stations	17
Aircraft Replenishment and Supply Center	1
Electronic Engineering Center	1
Academy	33
Reserve Training Center	2
Coast Guard Institute	2
Training and Supply Center, Alameda	1
Headquarters	29
District Office	81
Area Offices	2
Post Graduate School	34
Pensacola Air Station	14
Section Station	1
Unknown	12
Total	548

The Coast Guard processed the data from the questionnaire. The computer analyses utilized belonged to the CODAP programs.

Current Job-Task Inventory

The analytically determined task inventory listed 678 individual tasks, categorized into 19 different areas. These areas are as follows:

Administration	Knowledge/Ability	Ships
Aircraft	Motivation	Specialties
Counseling	Planning	Superiors
Equipment	Public	Supervising
Information	RCC/SAR	Training
Inspection	Security/Accountability	
Interviewing	Self-Improvement	

The individual tasks, as listed, serve as an inventory of job-tasks and form the basic step in the development of recommendations for additions to, or deletions, from the curricula at the Academy that are targeted at preparation for job entry. It should be noted that the Job Task Analysis was mostly concerned with job entry requirements in the present time frame. JTIQs, such as the one used in this study, will need to be updated periodically to reflect future changes in mission or job requirements.

The data collected from the responses to the job-task inventory questionnaire and the analyses of these data provide four additional steps in the development of curricular recommendations. The developmental steps are illustrated in the flowchart (Figure 3).

The Developmental Steps of the Job Task Technique

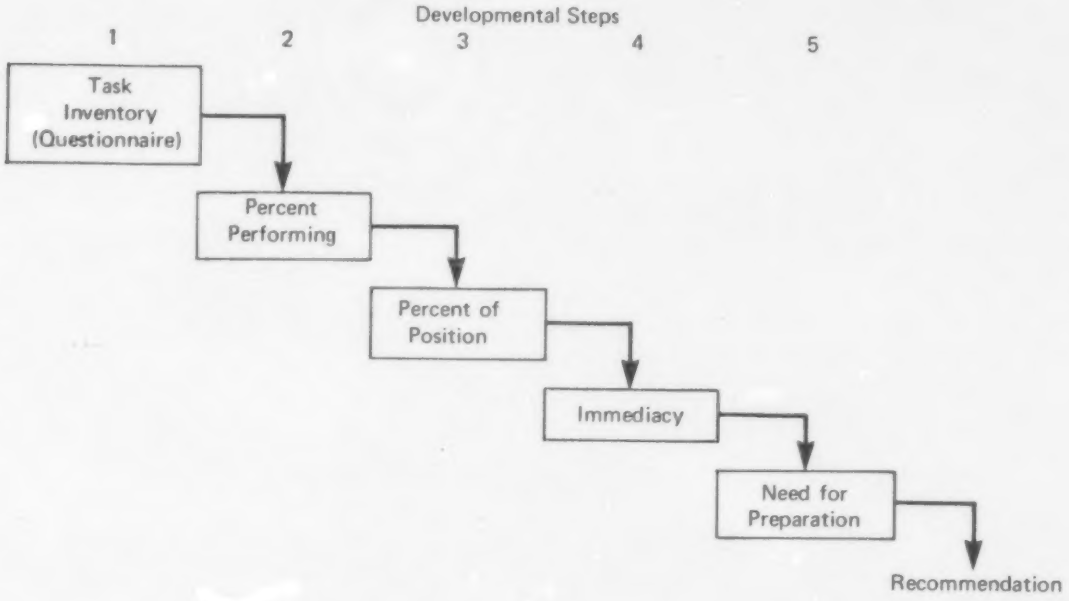


Figure 3

Percent of Sample Performing. Respondents were asked to respond to those of the 678 tasks that they performed. The first modification of the job-task inventory was made in accordance with the data reflecting performance or non-performance. The 678 tasks were ranked in order, from that task performed by the largest percent of the sample down to that task performed by the smallest percent of the sample. Other things being equal, those tasks performed by the majority of the sample are those for which training is especially reasonable.

Percent of Position. Respondents were asked to rate the 678 tasks on significance or importance, to include time spent performing that task and the criticality of that task. Significance was rated using a variation of Hemphill's (1959) *part of the position* scale:

1 - INSIGNIFICANT part of my job/duties
2 - NOMINALLY SIGNIFICANT part
3 - MODERATELY SIGNIFICANT part of my job/duties
4 - SIGNIFICANT part
5 - HIGHLY SIGNIFICANT part of my job/duties

(The part of the position scale is widely used to reflect a combination of criticality and time spent.) The variation used here is reported in terms of *percent of position*, where position is defined as all of the tasks performed by the sample. Other things being equal, those tasks that make up the largest percent of the Coast Guard job are those for which training is especially reasonable.

Immediacy. The next developmental step required an analysis of the data in terms of immediacy of job. The assumptions were made that the Ensigns in the sample represent incumbents of jobs assigned *soon* after graduation from the Academy and that the LTJGs, LTs, and LCDRs in the sample represent incumbents of jobs assigned relatively later. The rankings on percent performing for the job tasks were compared across the division of ensigns versus all others. The goal was to identify those tasks performed most often by Ensigns, least often by others. These tasks would be those that have greater immediacy, relative to others in the total list. Other things being equal, those tasks that are performed earlier in the Coast Guard career are those for which training is especially reasonable.

Need for Preparation. The respondents were asked to rate the 678 tasks they performed on amount of preparation needed. The rating scale was similar in form to the scale used to rate importance:

1 - MINIMAL PREPARATION needed before commissioning
2 - 20-40% PREPARATION needed
3 - 50% PREPARATION needed
4 - 60-80% PREPARATION needed
5 - MAXIMAL PREPARATION needed before commissioning

The resulting data indicate the extent to which a given task is judged to require preparation—education or training prior to job entry. Other things being equal, those tasks that are rated highly in need of preparation are those for which training is especially reasonable.

Conceptualization. These developmental steps (Task Inventory, Percent Performing, Percent of Position, Immediacy, and Need for Preparation) are conceptualized as progressive screening. The goal is to reduce the relatively numerous tasks in the inventory to a relatively manageable and reasonable list of candidate training objectives.

At each step in the progressive screening process a critical question is asked. The task inventory itself is in answer to the question: What tasks are performed by junior officers who are graduates of the USCG Academy? Step two is in answer to the question: Which tasks in the task inventory are performed by a majority of the sample of junior officers? Step three is in answer to the question: Which task of those performed by a majority of the sample make up the largest percentage of the job performed collectively by the sample? Step four is in answer to the question: Which of those tasks are performed early in the Coast Guard career? Step five is in answer to the question: Which tasks of those that make up the largest percentage of the first assignment are judged to most be in need of preparation prior to job entry? As these developmental steps provide answers to these questions, in sequence, the requirements related to preparation for job entry become increasingly clear.

However, the conceptual model of a progressive screening of tasks for training purposes does not automatically produce a "best" list of training objectives. Cut-off points for each step must be judiciously determined. The cut-offs, once determined, can answer the question: Is the USCGA meeting the requirements imposed by preparing for job entry?

Percent Performing and Percent of Position

Data: Percent Performing. The JOBDECK analysis combined all tasks (N = 678 and all subjects (N = 548) in a single analysis. The data present all tasks as ranked by percent of the sample performing (that is, the percent of the respondents who indicate on the questionnaire that they in fact do perform that task). Table 11 shows a partial listing of

Table 11

Tasks Ranked by Percent Performing

Task Title	Percent
Complete your assigned work	88.7
Use ability in English composition	86.5
Improve your ability/knowledge/skill	86.1
Complete official forms	82.7
Assess your attitudes toward CG as a career	81.0
Initiate fitness report on self	80.3
Assess your ability to be consistent	79.9
Write official message, letter, rapid-draft, etc.	79.6
Assess your ability to accept your limitations	79.4
Do extra work voluntarily	79.0
Assess your ability to be reliable	79.0
Assess your ability to plan ahead	79.0
Maintain appropriate relationship with superior	78.5
Recommend action/decision to superior	78.5
Receive orders/instructions for work from superior	77.9
Assess fairness of your decisions	76.8
Use office equipment, typewriter, etc.	76.1
Use ability in public speaking	75.5
Use knowledge of CG publications system	75.4
Assess your ability to adapt to unusual/emergency demands	75.4
Back up decision/action of superior	75.4
Assess your ability to handle adverse pressure	75.2
Assess openness of your communication	74.8
Assess appropriateness of your censure/criticism of others	73.7
Assess appropriateness of your praise/approval of others	73.2
Remain current in developments in specialty	73.2
Organize/provide information for superior	73.0
Set the example for subordinates	72.6
Assess your ability to adapt to organizational requirements	72.6
Yield to judgement of superior	72.6
Ask subordinate for information/advice	72.1
Assess your ability to adjust leadership style	72.1
Use official chain of command	71.9
Use principles of management/leadership	71.2

the results of a ranking by tasks; it shows the top 5% of the individual tasks. (Following the rank ordering step, percentages were rounded to the nearest tenth of a percent in this and the following tables.)

This analysis also provides data in terms of task areas ranked by percent of sample performing. Rank ordering of task areas by percent performing represents an unusual descriptive statistic. For a respondent to be counted as performing, he need only report performing one task in the task area. The statistic does not differentiate between those who report performing a very few tasks and those who report performing many or all tasks listed within the task area.

Data: Percent of Position. The analysis combined all tasks (N = 678) and all subjects (N = 548) in a single analysis. The data present all tasks as ranked by all subjects in order of average percent of position. The average percent of position is computed by (a) adding all of each individual's rankings and determining for each task what percent of the total it reflects and (b) adding the percentages for each task and determining the average percent over all subjects for that task. The result may be called *percent of position.* A partial ranking of these tasks is shown in Table 12, where the highest 5% tasks are tabulated.

Table 12

Tasks Ranked by Average Percent of Position

Task Title	Percent
Complete your assigned work	1.1
Improve your ability/knowledge/skill	1.0
Use ability in English composition	1.0
Remain current in developments in specialty	0.8
Use ability in public speaking	0.7
Assess your ability to plan ahead	0.7
Assess your attitudes toward CG as a career	0.7
Use principles of management/leadership	0.7
Assess your ability to be reliable	0.7
Assess your ability to accept your limitations	0.6
Assess your ability to be consistent	0.6
Do extra work voluntarily	0.6
Maintain appropriate relationship with superior	0.6
Write official message, letter, rapid-draft, etc.	0.6
Use ability in algebra	0.6
Recommend action/decision to superior	0.6
Assess your ability to handle adverse pressure	0.6
Organize/provide information for superior	0.6
Complete official forms	0.6
Receive orders/instructions for work from superior	0.6
Back up decision/action of superior	0.5
Assess openness of your communication	0.5
Use official chain of command	0.5
Set the example for subordinates	0.5

(Continued)

Table 12 *(Continued)*

Tasks Ranked by Average Percent of Position

Task Title	Percent
Assess your ability to adapt to unusual/emergency demands	0.5
Assess fairness of your decisions	0.5
Prepare/review correspondence	0.5
Use ability in calculus	0.5
Attend course in human relations	0.5
Assess your attitudes toward human relations	0.5
Assess your resistance to stress	0.5
Assess your ability to adapt to organization requirements	0.5
Report progress/status of work to superior	0.5
Assess your emotional control	0.5

This analysis also rank orders the task areas in terms of average percent of position. The complete results of this tabulation are shown in Table 13.

Table 13

Task Areas Ranked by Average Percent of Position

Task Area	Percent
Self-Improvement	15.6
Knowledge/Ability	11.6
Motivation	10.7
Superiors	9.1
Administration	7.6
Information	6.9
Training	5.7
Supervising	4.4
Equipment	4.3
Planning	4.0
Ships	3.7
Inspections	3.3
Aircraft	2.6
Security/Accountability	2.5
Counseling	2.2
Interviewing	1.8
RCC/SAR	1.4
Public	1.3
Specialties	0.9

The relationship between the two rankings is less than perfect; nevertheless, it is clear that the two orders reflect commonality of judgment concerning task criticality and time spent. It is suggested that the more definitive *task list* (rather than *task areas)* be used for purposes of the current developmental process.

NOTE: The data here represent the complete list of tasks. One would expect the test to show a diminution because of the use of a cut-off in percent performing. However, very little effect of this sort has occurred—the rank order correlation between percent performing and percent of position is positive and significant.

Comparison of Percent Performing and Percent of Position. A comparison of the top 5% of the tasks as ranked by percent of position and the top 5% of the tasks as ranked by percent performing is illustrative. The two lists of 34 items overlap on 26 items; that is, 26 of the top 5% of the tasks ranked by percent of position are also in the top 5% of tasks ranked by percent performing.

Implications: The top 10% of the tasks, as a minimum, need to be considered in the preparation of recommendations. The 64 tasks, and their associated training requirements follow:

Areas/Subjects	Job Requirements[a]	USCGA[b]
Self-Improvement	W	G
Improve your ability/knowledge/skill		
Remain current in developments in specialty		
Assess your ability to plan ahead		
Assess your attitudes toward the CG as a career		
Assess your ability to be reliable		
Assess your ability to accept your limitation		
Assess your ability to be consistent		
Assess your ability to handle adverse pressure		
Assess openness of your communication		
Assess your ability to adapt to unusual/emergency demands		
Assess fairness of your decisions		
Assess your attitudes toward human relations		
Assess your resistance to stress		
Assess your ability to adapt to organizational requirements		
Assess your emotional control		
Assess your ability to give clear orders		
Assess your ability to adjust leadership style		
Assess your ability to comply with orders in spirit and intent		
Assess your ability to distinguish between lack of ability and lack of motivation		
Assess appropriateness of your censure/criticism of others		
Assess your ability to grasp orders quickly		
Seek additional responsibility		
Assess appropriateness of your praise/approval of others		
Assess your ability to avoid dealing in personalities		
Attend course in human relations		

Areas/Subjects	Job Requirements[a]	USCGA[b]
Use of Knowledge/Ability		
Use ability in English composition	W	W
Use ability in public speaking	W	G
Use principles of mgmt/leadership	W	W
Use ability in algebra	W	W
Use ability in calculus	W	W
Use ability in trigonometry	W	W
Use knowledge of mechanical engineering	Q	Q
Use knowledge of physics	W	W
Use knowledge of CG publication system	G	G
Use ability in descriptive statistics	W	W
Use knowledge of CG directive system	G	G
Use engineering technical publications	G	G
Superior Oriented	W	G
Maintain appropriate relationship with superior		
Recommend action/decision to superior		
Organize/provide information for supervisor		
Receive orders/instructions for work from superior		
Back up decision/action of superior		
Report progress/status of work to superior		
Reach to immediate needs of superior		
Yield to judgement of superior		
Seek guidance from superior		
Brief superior on plan/program		
Use official chain of command		
Administration	W	G
Complete assigned work		
Write official message/letter/rapid-draft etc.		
Complete official forms		
Prepare/review correspondence		
Use office equipment, typewriter, etc.		
Use slide rule		
Maintain departmental records		
Initiate fitness report on self		
Do work voluntarily		
Establish work priorities		
Check accuracy of existing information		

Areas/Subjects	Job Requirements[a]	USCGA[b]
Subordinate Oriented	W	G
Set the example for subordinates		
Ask subordinate for information/advice		
Supervise enlisted personnel		
Assert authority over subordinate to get job done		
Delegate authority/responsibility to subordinate		

[a]Level of knowledge or proficiency required by job.

[b]Level of knowledge or proficiency currently met by Academy curricula.

W - Working Knowledge; G - General Knowledge; Q - Qualified. (Where no symbol is given for a specific task, symbol for area applies.)

Immediacy

An analysis (GRPDIF) separated the 102 Ensigns from the 446 higher ranking officers, in an attempt to shed light on the question of whether there is a difference in the job descriptions for these two groups. The two groups differ, for the purposes of this study, in recency of graduation from the Academy. Are the tasks of assignments immediately after graduation different from those tasks of assignments later on? The goal is *not* to describe the "Ensign tasks" simply and separately—the goal is to maintain the unity of the junior officer corps, and limit the separation to an identification of tasks that receive emphasis in the more immediate assignments (and, conversely, an identification of tasks that receive relatively more emphasis in later assignments).

The analysis identified differences in the percent performing each task. The data were ordered from the largest positive task difference to the largest negative task difference. A positive difference reflected a higher percent of LTJGs and above who performed the task; a negative difference reflected a higher percent of Ensigns. The discussion will be limited to the 50 highest-ranked positive (less immediate) tasks and the 50 highest-ranked negative (more immediate) tasks.

Analysis of the 50 tasks with the highest positive group differences (see Table 14) reveals that later assignments are more involved with aircraft, knowledge/ability, planning, and administrative type tasks. The higher-ranking officers coordinate with other units, supervise junior officers, define unit goals, organize logical priorities for work, and perform aircraft and RCC/SAR activities. (Activities of the latter type are not typically performed by Ensigns; by the time an officer has served his initial tour of duty and attended flight school, he has usually been promoted.)

Analysis of the 50 tasks with the highest negative group differences (Table 15) reveals that immediate assignments are more involved with ship handling, supervising, security/accountability, and equipment. For example, Ensigns maneuver ships to maintain prescribed course and speed, plot navigational fixes, use ships radar systems, use LORAN equipment, and identify/destroy outdated classified material and equipment.

The *tasks* that admit to greater immediacy are prime candidates for training. Immediacy alone, however, cannot predicate selection for training. Many, if not all, task activities accomplished by junior officers are performed under supervision of senior officers, and often within the context of on-the-job training.

Table 14

50 Tasks With Highest Positive Differences[a]

(Less Immediate)

Task	Difference (%)
Coordinate with other units	20.8
Supervise junior officers	20.3
Define unit goals clearly	20.0
Prepare/review correspondence	17.0
Initiate fitness report on self	16.8
Organize logical priorities for work	16.5
Use code of federal regulations	15.1
Brief superior on board/committee meeting	14.4
Attend course in drug education	14.4
Prepare/review recommendations for decoration/award	14.1
Use ability in descriptive statistics	14.1
Attend course in human relations	14.0
Determine requirements for office space/equipment	13.9
Use knowledge of CG directives system	13.8
Conduct preflight inspection	13.6
Use Federal Aviation Regulations	13.5
Use ability in English composition	13.5
Interpret marine law/CG regulations to small boat owner	13.5
Take off from/land on land	13.4
Plan flight	13.1
Write procurement request	13.1
Write trip report	13.0
Fly at prescribed course/speed	12.9
Remain current in developments in specialty	12.8
Brief aircraft pilot on SAR missions	12.6
Estimate time/cost to accomplish planned task	12.5
Develop proficiency in aircraft in which training is received	12.5
Operate aircraft radio communication system	12.4
Inventory plant/station property	12.3
Maintain proficiency in aircraft in which qualified	12.2
Coordinate on-scene movements during SAR missions	12.2
Maneuver aircraft into flight pattern	12.2
Make recommendation on use of aircraft to RCC	12.1
Analyze cost-effective/cost-reduction data	12.0
Write conference report	11.9
Operate transponder	11.8
Participate in conference with representatives of industry	11.8
Interpret panel instruments during IFT flight	11.6
Study Federal Aviation Regulations	11.5
Perform duties of Operations Duty Officer (ODO)	11.4

(Continued)

Table 14 *(Continued)*

50 Tasks With Highest Positive Differences[a]

(Less Immediate)

Task	Difference (%)
Designate search pattern for SAR missions	11.4
Supervise civilian clerical workers	11.3
Use blueprint	11.3
Project manpower requirement	11.3
Compute takeoff weight of aircraft	11.1
Establish performance standards	11.0
Use ability in algebra	11.0
Brief superior on plan/program	10.9
Use formal systems analysis procedures	10.9
Use radio direction finder (RDF)	10.8

[a]Higher percent of LTJGs performing the task, as contrasted with Ensigns.

Table 15

50 Tasks With Highest Negative Differences[a]

(More Immediate)

Task	Difference (%)
Maneuver ship to maintain prescribed course/speed	-56.2
Plot navigational fix	-53.9
Use ship radar system	-51.9
Maneuver ship to pick up object in water	-51.1
Plot LORAN lines on chart	-50.8
Use sextant	-49.8
Use radar	-49.5
Use intra-ship communication system	-49.0
Participate in visit/search drill	-46.9
Maneuver ship to keep in channel/formation	-46.0
Use maneuvering board	-45.2
Use LORAN equipment	-45.0
Plot contact reported from CIC	-42.6
Supervise plotting of LORAN lines	-41.8
Maneuver ship in docking/undocking operations	-39.9
Use celestial navigation techniques	-39.7

(Continued)

Table 15 *(Continued)*

50 Tasks With Highest Negative Differences[a]

(More Immediate)

Task	Difference (%)
Use tides and current tables	-38.7
Use sounding equipment	-38.7
Investigate incident prior to mast/civil/criminal/court martial action	-38.3
Supervise watch	-37.9
Maneuver ship to anchor/weigh anchor	-36.9
Plot RDF/ADF line	-35.9
Use RDF/ADF	-34.5
Maintain Unit Log	-34.5
Account for cash	-34.5
Plot sounding	-34.1
Supervise evolutions of watch routine	-32.6
Audit billings/records/accounts	-32.5
Inspect gyrocompass for error	-31.0
Supervise evolutions during routine drill	-30.9
Learn the language of the old salt	-30.7
Maintain record of publications	-30.4
Recommend pass for good worker	-29.4
Inventory cash on hand	-29.1
Operate helm/rudder	-28.2
Supervise maintenance of official log	-28.0
Use voice radio	-27.5
Check quality of food being served	-27.4
Conduct training session on human relations	-27.2
Prepare exchange/commissary report	-26.7
Supervise administration of official CG test	-25.7
Refer subordinate to CO or XO	-25.5
Administer test for advancement	-24.7
Learn the language of the young sailor	-24.5
Identify/destroy outdated classified material/equipment	-24.2
Give verbal orders to the relieving officer	-24.1
Train assigned personnel in use of navigational instruments	-23.9
Assign personnel to jobs/duties	-24.1
Inspect the registered publications system to insure compliance with regulations	-23.4
Decode/encode off-line crypto message	-22.9

[a] Higher percent of Ensigns performing the task, as contrasted with LTJGs and above.

Implications: The more immediate tasks need to be considered in the preparation of recommendations. These tasks, and their training requirements follow:

Areas/Tasks	Job Requirements[a]	USCGA[b]
Ships	W	W
Maneuver ship to maintain prescribed course/speed		
Plot navigational fix		
Use ship radar system		
Maneuver ship to pick up object in water		
Plot LORAN lines on chart		
Use sextant		
Use radar		
Use intra-ship communication system		
Participate in visit/search drill		
Maneuver ship to keep in channel/formation		
Use maneuvering board		
Use LORAN equipment		
Plot contact reported from CIC		
Supervise plotting of LORAN lines		
Maneuver ship in docking/undocking operations		
Use celestial navigation techniques		
Use tides and currents tables		
Use sounding equipment		
Investigate incident prior to mast/civil/criminal/court-martial		
Supervise watch		
Maneuver ship to anchor/weigh anchor		
Plot RDF/ADF line		
Use RDF/ADF		
Plot sounding		
Supervise evolutions of watch routine		
Inspect gyrocompass for error		
Supervise evolutions during routine drill		
Learn the language of the old salt		
Operate helm/rudder		
Supervise maintenance of official log		
Use voice radio		
Training assigned personnel in use of navigational instruments		
Administration	W	G
Maintain unit log		
Account for cash		
Audit billings/records/accounts		
Maintain record of publications		
Recommend pass for good worker		

Areas/Tasks	Job Requirements[a]	USCGA[b]
Inventory cash on hand		
Check quality of food being served		
Conduct training session on human relations		
Prepare exchange/commissary report		
Supervise administration of official CG test		
Refer subordinate to CO or XO		
Administer test for advancement		
Learn the language of the young sailor		
Identify/destroy outdated classified material/equipment		
Give verbal orders to the relieving officer		
Assign personnel to jobs/duties		
Inspect the registered publications system to insure compliance		
Decode/encode off-line crypto message		

[a]Level of knowledge or proficiency required by job.
[b]Level of knowledge or proficiency currently met by Academy curricula.
W - Working Knowledge; G - General Knowledge. (Symbols apply to entire area rather than to specific tasks.)

Need for Preparation

In the JTIQ booklet the respondent was asked to identify those tasks that he accomplished in his present job and to judge the significance of each of these tasks. The respondent was also asked to rate how much precommissioning training and education should be given for those tasks that he identified as job tasks. The following rating scale was used:

1 - MINIMAL PREPARATION needed before commissioning
2 - 20-40% PREPARATION needed
3 - 50% PREPARATION needed
4 - 60-80% PREPARATION needed
5 - MAXIMAL PREPARATION needed before commissioning

An analysis (ASFACT) of these data indicates that 154 of the 678 tasks (23%) received an average ranking of 3.00 (50% preparation) or higher. The first 100 of these tasks are listed, in order, in Table 16. The respondents felt that most of the items (76%) contained in the task list did not require an extensive amount of preparation during precommissioning training and education. This finding implies that the respondents felt that a significant number of job tasks need no preparation or could be learned in on-the-job instruction. The average need for preparation for each task area is shown in Table 17. A reasonable cut-off has been determined to be *50% preparation.*

The following content analysis has been performed as a means of establishing some very general insights into the results of the current job-task inventory questionnaire technique and the attendant developmental steps. The content analysis was performed on the top 100 tasks (in terms of judged need for preparation). Thirty-seven percent of the top 100 tasks deal specifically with ships, shipboard procedures, and ship handling. If additional ship-related tasks, such as those dealing with RCC/SAR, are included, about one-half of the top 100 tasks are covered within the general area of ships.

Table 16

Tasks Ranked by Need for Preparation

Rank	Task	Mean
1	Use celestial navigation techniques	4.01
2	Plot navigational fix	4.00
3	Use principles of management/leadership	3.96
4	Operate GFCS MK 52/56	3.92
5	Plot contact reported from CIC	3.92
6	Maneuver ship in docking/undocking operation	3.88
7	Maneuver ship to position buoy	3.87
8	Decode/encode off-line crypto message	3.86
9	Maneuver ship to keep in channel/formation	3.86
10	Maneuver ship to pick up object in water	3.84
11	Maneuver ship to take vessel under tow	3.84
12	Use ability in English composition	3.83
13	Use ability in calculus	3.80
14	Set the example for subordinates	3.78
15	Teach professional subjects at USCGA	3.78
16	Maneuver ship to anchor/weigh anchor	3.77
17	Use sextant	3.76
18	Use maneuvering board	3.76
19	Maneuver ship to maintain prescribed course/speed	3.73
20	Use knowledge of naval architecture	3.70
21	Use ability in public speaking	3.68
22	Inspect the Registered Publications System to insure compliance with regulations	3.67
23	Attend course in human relations	3.67
24	Use ability in trigonometry	3.64
25	Serve as on-scene commander during SAR mission	3.64
26	Use tides and currents tables	3.63
27	Use ship radar system	3.61
28	Use principles of law	3.59
29	Use knowledge of physics	3.58
30	Plot LORAN lines on chart	3.58
31	Provide location fix for aircraft	3.58
32	Use knowledge of mechanical engineering	3.55
33	Use ability in algebra	3.54
34	Plan SAR operation	3.54
35	Initiate SAR plan from RCC	3.51
36	Supervise firing of gun	3.46
37	Plot RDF/ADF line	3.45
38	Record/plot position of sea/air traffic	3.45
39	Use damage control/fire fighting equipment	3.42
40	Supervise enlisted personnel	3.41

(Continued)

Table 16 *(Continued)*

Tasks Ranked by Need for Preparation

Rank	Task	Mean
41	Use knowledge of humanities	3.40
42	Determine search parameters	3.40
43	Serve as SAR mission coordinator	3.40
44	Designate search pattern for SAR missions	3.38
45	Audit/regulate classified publications/equipment	3.38
46	Use ability in descriptive statistics	3.36
47	Use UCMJ to maintain discipline	3.36
48	Arbitrate dispute between small boat owners	3.36
49	Supervise evolutions of fog navigation detail	3.36
50	Investigate incident prior to mast/civil/criminal/court-martial action	3.34
51	Use ability in engineering graphics	3.34
52	Use radar	3.33
53	Use voice radio	3.33
54	Explain Coast Guard objectives/missions	3.33
55	Use principles of Gunnery/Fire Control/Naval Gunfire Support	3.33
56	Arbitrate dispute over fishing rights	3.33
57	Inspect 3"/50 or 5"/38 being dropped out of battery/placed back into battery	3.32
58	Plot sounding	3.32
59	Train personnel to investigate pollution incidents	3.32
60	Improve your ability/knowledge/skill	3.30
61	Supervise evolutions of small boat crew	3.30
62	Supervise preparation for towing	3.30
63	Teach non-professional subjects at USCGA	3.30
64	Conduct battery prefiring/postfiring checks for all gun batteries	3.29
65	Demonstrate techniques/procedures	3.29
66	Use knowledge of meteorology	3.28
67	Identify/destroy outdated classified material/equipment	3.27
68	Brief personnel on UCMJ	3.26
69	Coordinate fund raising campaign	3.26
70	Conduct training session in drug education	3.24
71	Use ability in inferential statistics	3.23
72	Use knowledge of chemistry	3.23
73	Use navigational computer	3.23
74	Use small arms	3.22
75	Plot navigational fix	3.21
76	Use LORAN equipment	3.21
77	Distribute information on safe navigational route	3.21
78	Make official report to an investigative board	3.21
79	Coordinate with aircraft in the process of ditching	3.21
80	Fulfill duties of Damage Control Assistant	3.21

(Continued)

Table 16 *(Continued)*

Tasks Ranked by Need for Preparation

Rank	Task	Mean
81	Train damage control party	3.21
82	Coordinate on-scene communications during SAR missions	3.20
83	Supervise radar monitoring of aircraft/ship	3.20
84	Prepare prescribed training program	3.20
85	Inspect merchant vessel for compliance with laws/regulations	3.19
86	Plan case for trial	3.19
87	Stand engineering watches (EWO, throttle, oiler, aux., boiler, evap., DC, cold iron)	3.18
88	Train subordinate leaders	3.18
89	Classify/declassify message	3.17
90	Supervise evolutions during emergency drill	3.17
91	Supervise evolutions during routine drill	3.17
92	Counsel subordinate on drug education	3.17
93	Use principles of economics	3.16
94	Administer an Engineering Department	3.16
95	Identify incident of pollution and its cause	3.16
96	Supervise launching/recovery of buoy	3.16
97	Complete your assigned work	3.15
98	Supervise loading of hazardous material	3.15
99	Delegate authority/responsibility to subordinate	3.14
100	Train subordinates in use of small arms	3.13

Table 17

Average Need for Preparation for Each Task Area

Task Area	Mean	Task Area	Mean
Knowledge/Ability	3.20	Specialties	2.53
RCC/SAR	3.04	Planning	2.51
Ships	2.91	Counseling	2.51
Superiors	2.64	Inspections	2.44
Training	2.64	Security/Accountability	2.41
Interviewing	2.61	Information	2.40
Equipment	2.61	Public	2.16
Motivation	2.60	Administration	1.97
Supervising	2.58	Aircraft	1.61
Self-Improvement	2.58		

The second major area is the task area of Knowledge/Ability. About 20% of the top 100 tasks are made up of this category—for example, Use ability in calculus, Use ability in English composition, and Use knowledge of naval architecture.

The final items on this list (30%) consist of several tasks from many different areas. No clear pattern seems to emerge from this residual.

An unexpected result is that in the top 100 tasks, only four deal directly with leadership. These are:

Set the example for subordinates (ranked 14)
Supervise enlisted personnel (ranked 40)
Train subordinate leaders (ranked 88)
Delegate authority/responsibility to subordinates (ranked 99)

The officers surveyed believe that a nominal amount of leadership preparation is necessary prior to commissioning. A detailed analysis of the data indicates that out of 133 leadership-related tasks, 124 were rated 2 (i.e., 20-40% preparation needed), five were rated 1 (minimal preparation needed), and four were rated 3 (50% preparation needed).

Implications: The tasks that were judged to be needed in precommissioning training should be considered in the preparation of recommendations for curricular modification. Those tasks are as follows:

Areas/Tasks	Job Requirements[a]	USCGA[b]
Ships		
Use celestial navigation techniques	G	G
Plot navigation fix	G	G
Plot contact reported from CIC	G	G
Maneuver ship in docking/undocking operations	G	G
Maneuver ship to position buoy	G	G
Maneuver ship to keep in channel/formation	G	G
Maneuver ship to pick up object in water	G	G
Maneuver ship to take vessel under tow	G	G
Maneuver ship to anchor/weigh anchor	G	G
Use sextant	G	G
Use maneuvering board	G	G
Maneuver ship to maintain prescribed course/speed	G	G
Use tides and currents tables	G	G
Use ship radar system	G	G
Plot LORAN lines on chart	G	G
Provide location fix for aircraft	G	G
Supervise firing of gun	G	G
Plot RDF/ADF line	G	G
Record/plot position of sea/air traffic	G	G
Use of Knowledge		
Use ability in English composition	W	W
Use ability in calculus	W	W
Use knowledge of naval architecture	W	W
Use ability in public speaking	W	G
Use ability in trigonometry	W	W

Areas/Tasks	Job Requirements[a]	USCGA[b]
Use principles of law	W	W
Use knowledge of physics	W	W
Use knowledge of mechanical engineering	W	W
Use ability in algebra	W	W
Use knowledge of humanities	W	W
Use ability in descriptive statistics	W	W
Security and Classified Publications		
Inspect the Registered Publications System to insure compliance with regulations	G	G
Audit/regulate classified publications/equipment	G	G
RCC/SAR		
Serve as on-scene commander during SAR mission	G	G
Plan SAR operation	G	G
Initiate SAR plan from RCC	G	G
Determine search parameters	G	G
Serve as SAR mission coordinator	G	G
Designate search pattern for SAR missions	G	G
Leadership		
Supervise enlisted personnel	G	G
Use principles of management/leadership	G	G
Set the example for subordinates	G	G
Attend course in human relations	G	G
Use UCMJ to maintain discipline	G	G
Law		
Investigate incident prior to mast/civil/criminal/court-martial action action	G	G
Misc.		
Tech professional subjects at USCGA	G	W

[a]Level of knowledge or proficiency required by job.
[b]Level of knowledge or proficiency currently met by Academy curricula.

The USCGA is currently able to meet the requirements imposed by preparation for job entry.

PREPARATION FOR LEADERSHIP

The overall goal of this section is to describe the totality of educational and training requirements imposed upon the curricula of the Academy. A special category of requirements consists of those related to preparing the cadet for a military leadership role.

For purposes of the present paper, military leadership will be dealt with in terms of role theory. A role consists of the rights, privileges, duties, and obligations of any occupant of a position in relation to persons occupying other positions. That is, within a formal organization, a position holder has certain privileges and obligations. These privileges and obligations are established by expectations which other position holders have for him. For example, the responsibilities of an Ensign are determined by the expectations held for his position by both his superiors and his subordinates. In order to be fully effective in his position, the Ensign must do what his superiors expect him to do and also, to a substantial extent, what his immediate subordinates expect. It can be parenthetically noted that the latter is so because their expectations are reasonably realistic and reflect leader actions generally required for mission accomplishment.

Two aspects of a role must be considered. First are the specific behaviors expected of the individual in his position. These behaviors must be the proper behaviors and they must be effective in accomplishing their purpose. The general purpose, of course, is facilitating organizational mission accomplishment. The second aspect of a role is the appropriateness of performance. This refers specifically to the manner in which the performance occurs. Correct behavior may not be effective if it is performed inappropriately.

Identification of Leadership Behaviors

The identification of proper role behaviors is an extremely difficult task; the identification of appropriate manner is almost impossible. Advice was sought from the consultants as to the form and content of leadership task statements in order to assure that the statements would be Coast Guard specific and taxonomically valid. A list of role behavior areas was developed from a study of previous work in leadership area, including research done within a Coast Guard setting. Suggestions for specific items within role behavior areas were solicited from a variety of Coast Guard personnel at Governors' Island, New London, Pensacola, Boston, Cleveland, Cheboygan, and Washington. The good efforts of the consultants, the staff, and the CG personnel resulted in an interview guide and the leadership sections of the job-task inventory questionnaire. The Coast Guard junior officer fitness report was also used as a source of data.

Data: The Report on Fitness. The fitness report form (Report on the Fitness of Lieutenants (JG), Ensigns and those Chief Warrant Officers with less than two years service, CG4328A, rev. 3-72) was developed specifically for use with Coast Guard junior officers and represents a significant source of data—the operational expectations to be considered in performance evaluation. The leadership behaviors listed and described in sections 14 and 17 of the fitness report reflect the judgment of the service.

Data: Leadership Job Task Inventory. The leadership items were an integral part of the job-task inventory questionnaire. In point of fact, numerous items developed as leadership items were duplicated as job-task items. Moreover, several items developed as leadership items could be given a job-task reading. (For example, the item responded to by the largest percentage of the sample (88.68%), *Complete your assigned work*, was read (a) as "motivate your men by completing your *own* assigned work" and (b) as "I have to spend some time getting my work done.") Nevertheless, for the purposes of this discussion, four task areas will be defined as the leadership inventory: motivation, self-improvement, supervising, and tasks relating to superiors (leadership *up*).

The data of choice for defining the magnitude of the leadership tasks within the context of the total Coast Guard junior officer job are the *percent of position* data from the job-task inventory questionnaire. These data indicate that the four explicit leadership task areas account for 39.79% of the total position. Tasks within the self-improvement area account for 15.52% of the job, tasks within the motivation area account for 10.73%, tasks relating to superiors account for 9.11%, and tasks within the supervising area account for 4.43%.

The data of choice for estimating requirements for training are, within the context of this research, the *need for preparation* data from the Job-Task Inventory Questionnaire. These data indicate that tasks within the supervising area had an average rating of 2.63, meaning that those tasks, on the average, were judged to be closer to 50% preparation needed (3) than to 20-40% preparation needed (2). Tasks within the self-improvement areas had an average rating of 2.59. Tasks relating to superiors and to motivation (leadership *up* and *down*) both had an average of 2.59.

Data: The Leadership Interview Guide. The leadership interview guide was used with a small number of selected active duty USCG personnel. During the interviews, the areas of role behavior were discussed in order to assess the importance of the areas, the extent to which responsibility is shared in each of these areas, and whether junior officers need improvement in them. Table 18 lists the role behavior areas, the assessment of importance, and whether the junior officers share responsibility. Sharing is the key factor here; the greater the overlap between the roles of the junior officer and the chief, the lower the importance for the junior officer. There was agreement among the persons interviewed that all of these areas of role behavior are important. The table shows that some areas are relatively more important than others.

Discussions during the interviews and an analysis of the interview results indicated a need for improvement in six major areas: planning, initiating, interpersonal competence, role differentiation, involving subordinates, and developing subordinates' pride. The key concept here again is shared responsibility (or its obverse, concentrated responsibility). Table 19 brings forward those areas of high importance and indicates whether responsibility is shared and whether there is need for improvement. These six areas cluster into three major areas for training purposes.

Personnel Management Tasks. Role performances of planning and initiating are managerial in nature. They involve looking ahead, sorting out problems and priorities, and seeing that they are dealt with. These functions probably cannot be accomplished without a substantial degree of practical experience, more than the junior officer has when he assumes the responsibilities of his initial duty assignment. This is not to say that the junior officer should be fully competent upon commissioning. Rather, the more competent he is upon commissioning, the sooner he will be able to assume the full responsibilities of his position.

Role Differentiating Tasks. Role differentiation is knowing one's own responsibilities in relation to those of subordinates and superiors. It probably requires an understanding of the Chief's (and other subordinates') roles, as well as their values, attitudes, and so forth. These functions probably cannot be accomplished without considerable training. Obviously, the greatest benefits would result from practical experience—working within a job context. However, opportunity for this form of rehearsal is very limited.

Interpersonal Tasks. Interpersonal tasks include interpersonal competence, involving subordinates, and developing subordinates' pride. These are areas focusing on the junior officer's skills in interacting successfully with superiors and subordinates to accomplish leadership and organizational objectives. Again, these functions probably cannot be accomplished without a formal rehearsal by working with people.

Table 18

Role Behavior Areas

Behavior Area	Shared?	Importance
Planning	No	High
Initiating	Some	High[a]
Interpersonal Competence	N/A[b]	High
Problem Solving	Yes	High
Personal Example	N/A[b]	High
Self Control	N/A[b]	High
Fair Evaluations	Yes	High
Role Differentiation	N/A[b]	High
Involving Subordinates	No	High
Loyalty to Subordinates	No	High
Goal Orientation	Yes	High
Developing Teamwork	Yes	High
Developing Subordinates' Pride	No[c]	High
Organizing	Yes	Intermediate
Coordinating	Yes	Intermediate
Training and Developing Subordinates	Yes	Intermediate
Performance Feedback	Yes	Intermediate
Directing	Yes	Low[d]
Controlling	Yes	Low[d]
Assessing Subordinates	Yes	Low[d]
Expecting High Performance	?	?
Helping Subordinates with Personal Problems	Yes	?
Hygiene Factors	Yes	?

[a]Not so high during immediate post-commissioning period.

[b]Not Applicable. May be a requirement at many levels, so it is not a shared responsibility but more a universal responsibility.

[c]However, subordinate leaders should also use this leadership tool.

[d]Because Chief has main responsibility here.

Data: Congruence of Leader Behaviors. The three major areas of leadership behavior for which improvement was judged necessary are compatible with the four leadership areas of the JTIQ and the items of the fitness report. Specific examples, taken from the inventory and the report, have been related to the interview areas and are given below. The JTIQ data presented reflect percent performing.

Personnel Management Tasks

From the fitness report:

Makes decision
Makes commitments
Schedules own and subordinates' work

Table 19

Highly Important Behavior Areas

Behavior Area	Shared?	Need for Improvement
Planning	No	Yes
Initiating	No	Yes
Involving Subordinates	No	Yes
Loyalty to Subordinates	No	No
Developing Subordinates' Pride	No	Yes
Problem Solving	Yes	--
Fair Evaluations	Yes	--
Goal Orientation	Yes	--
Developing Teamwork	Yes	--
Interpersonal Competence	N/A	Yes
Personal Example	N/A	No
Self Control	N/A	No
Role Differentiation	N/A	Yes

Accepts responsibility for subordinates
Withholds judgment until he has necessary facts

From the JTIQ:

Use principles of management/leadership	(71.2)
Keep subordinates informed about current situation	(63.0)
Check work of subordinate before passing it along	(61.7)
Clarify area of uncertainty in orders/instructions	(55.3)
Help subordinate via supervision	(55.8)

Role Differentiation Tasks

From the fitness report:

Observes lines of authority, both up and down
Teaches subordinates
Keeps appropriate person informed
Supports policies and action of superiors

From the JTIQ:

Maintain appropriate relationship with superior	(78.5)
Back up decision/action of superior	(75.4)
Use official chain of command	(71.9)
Delegate authority/responsibility to subordinates	(65.0)
Assume responsibility in absence of superior	(61.5)

Interpersonal Tasks

From the fitness report:

Gets along with peers
Considers ideas and suggestions of subordinates
Corrects subordinate in constructive manner
Takes active interest in personal problems of subordinates

Praises subordinates when deserved
Takes share of undesirable duty

From the JTIQ:

Set the example for subordinates	(72.6)
Critique good performance to show appreciation	(63.1)
Encourage upward communication for subordinate	(62.8)
Critique poor performance to enable improvement	(61.5)
Counsel subordinate on job performance	(61.0)

Preparation for personnel management, role differentiation, and interpersonal tasks implies a need for training. Moreover, preparation for all three areas indicates a need for a competence founded in practical experience.

Some of the needs for training can be met by "innoculation"—by exposing the cadet to specific representative tasks that will be encountered later, during his first assignment. These training needs, in terms of specific tasks, have been addressed in the section, Preparation for Job Entry. However, a large portion of the training requirement, which now is addressed by intellectual appeal to the cognitive learning of principles, may need to be replaced with the opportunity to learn in experimental settings with appropriate feedback.

Implications. Preparation for leadership must be considered in the development of recommendations for curricular change. Those leadership tasks judged to be most significant follow:

Areas/Tasks	Job Requirements[a]	USCGA[b]
Personnel Management Tasks	W	G
Makes decisions		
Meets commitments		
Schedules own and subordinates work		
Accepts responsibility for subordinates		
Withholds judgement until he has the necessary facts		
Use principles of management/leadership		
Keep subordinates informed about current situation		
Check work of subordinate before passing it along		
Clarify area of uncertainty in orders/instructions		
Help subordinate via supervision		
Role Differentiation Tasks		G
Observes lines of authority (up-down)		
Teaches subordinates		
Keeps appropriate person informed		
Supports policies and actions of superiors		
Maintain appropriate relationship with superior		
Back up decisions/action of superior		
Use official chain of command		
Delegate authority/responsibility to subordinates		
Assume responsibility in absence of superior		

Areas/Tasks	Job Requirements[a]	USCGA[b]
Interpersonal Tasks	W	G
Gets along with peers		
Considers ideas and suggestions of subordinates		
Corrects subordinate in constructive manner		
Takes active interest in personal problems of subordinates		
Praises subordinates where deserved		
Takes share of undesirable duty		
Set the example for subordinates		
Critique good performance to show appreciation		
Encourage upward communication for subordinate		
Critique poor performance to enable improvement		
Counsel subordinate on job performance		

[a]Level of knowledge or proficiency required by job.
[b]Level of knowledge or proficiency currently met by Academy curricula.
W - Working knowledge; G - General knowledge. (Symbols apply to entire area rather than to specific tasks.)

SUMMARY AND CONCLUSIONS

The question of whether or not the Academy is able to meet the requirements for education and training has been answered in general terms.

Accreditation by NEASCI. The USCGA is able to meet the requirements imposed by maintaining membership in, and accreditation by, NEASCI. Accreditation by NEASCI stimulates no specific recommendation.

Accreditation by ECPD. The USCGA is able to meet the requirements imposed by application for accreditation by ECPD. The curricula of engineering has been modified to become responsive to ECPD requirements. Accreditation by ECPD stimulates no specific recommendation.

Preparation for Postgraduate Study. The USCGA is able to meet the requirements imposed by preparation for postgraduate study. Nevertheless, general recommendations are stimulated:

Competition for admission into postgraduate programs is a major problem. The Coast Guard would profit from (a) a thorough study of this problem and (b) a continually revised program for assisting in matching individual officer needs to individual postgraduate programs.

Preparation for success in postgraduate programs is not a major problem. However, since it is only wise to allow future graduates to profit from the experience of their predecessors, the USCG would benefit from a periodic survey of graduates in postgraduate programs concerning their specific needs *vis a vis* preparatory courses.

Preparation for Professional Occupations. The USCGA will not be able to meet the needs imposed by increased professionalism, with its current curricula. Increased professionalism is emerging in two modes. First, more professionals are required in the traditional areas within the Coast Guard. Second, new professions are required to fill out the ever diversifying missions of the Coast Guard. The USCGA cannot be expected to meet either or both of these incremental needs.

Preparation for Job Entry. The USCGA cannot hope to meet the totality of educational and training requirements imposed by preparation for job entry. The educational and training objectives that surfaced in the task inventory have been processed through a progressive screening. The result is a truncated set of requirements. These requirements have stimulated specific curricular recommendations which the USCGA is able to accommodate.

Preparation for Leadership. The USCGA is not currently meeting all of the requirements imposed by preparation for leadership. The research data have stimulated specific curricular recommendations, which the USCGA is able to accommodate.

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This report presents the results of research that had as its objective the evaluation of the curricula of the U.S. Coast Guard Academy. Over 125 Coast Guard officers and men were interviewed, to gather detailed background information about the Coast Guard, the Coast Guard Academy, and job requirements of Academy graduates. These data were developed into a job-Task Inventory Questionnaire (JTIQ) which was administered to Academy graduates,

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and yielded information as to the critical tasks required of officers during their early years of Coast Guard service. The JTIQ responses and two CG-developed documents ("A Study to Determine the Future Commissioned Officer Requirements of the CG-1972-1982" and the "Long Range View" paper) were analyzed and, through standard systems analytic procedures, recommendations for changes to the Academy curricula were developed.

HUMAN RESOURCES RESEARCH ORGANIZATION

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RESEARCH DIVISIONS

HumRRO Division No. 1 (System Operations) 300 North Washington Street Alexandria, Virginia 22314	Dr. J. Daniel Lyons Director
HumRRO Division No. 2 Fort Knox, Kentucky 40121	Dr. Donald F. Haggard Director
HumRRO Western Division Post Office Box 5787 Presidio of Monterey, California 93940	Dr. Howard H. McFann Director
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